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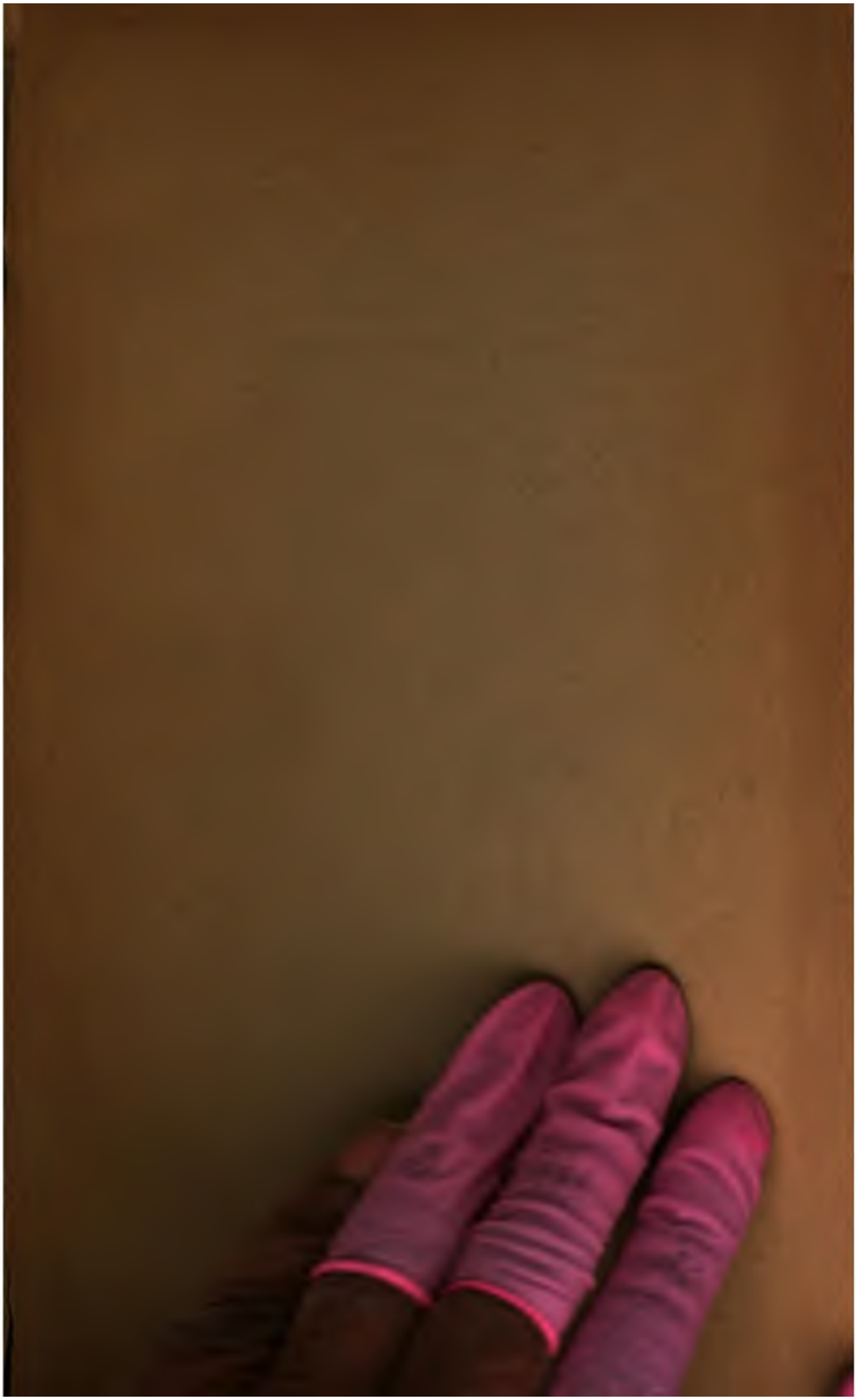

VOL. XII NO. 1

UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

ISSUED BY
THE BUREAU OF MEDICINE AND SURGERY
NAVY DEPARTMENT
DIVISION OF PUBLICATIONS
MEDICAL INSPECTOR J. S. TAYLOR, U. S. NAVY
IN CHARGE

JANUARY, 1918

(QUARTERLY)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties, with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
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The reaction as described by Gay,[1] Miller,[2] Scully,[3] and others[4] consists of a severe chill, accompanied by headache, nausea, and vomiting, followed by high fever and a leucocytosis ranging from 15,000 to 100,000. The usual dosage in a debilitated patient[5] or a large dose administered accidentally[1] produce the more severe symptoms of anaphylactic shock, namely, urticaria, hemorrhages from the mucous membranes, dyspnea, cyanosis, rigor, dilatation of the heart, and general collapse.

The usual initial dosage is about 40,000,000 killed bacilli with subsequent dosage up to 150,000,000, although Gay has used the equivalent of 300,000,000 bacilli in sensitized vaccine sediment as an initial dose and increased amounts subsequently. All workers agree that the first injection should consist of a small number of bacilli, allowing the size of further dosage to be governed by the severity of the reaction resulting from the first administration.

In this case it will be noted that one-half c. c. of standard typhoid vaccine or 500,000,000 bacilli with no special method of preparation was given intravenously, resulting in a marked reaction, one manifestation of which was a high fever. Then, seven days later, at the height of sensitization, a second dose even larger than the first was given. Thus over three times the maximum dose ordinarily used was given at the first injection, and four (probably more) times the maximum dose was given the second time, resulting in the typical symptoms of anaphylactic shock with death four hours later. The autopsy findings also correspond with those described in the experimental anaphylaxis of animals.

This method of treatment, though regarded as harmless by most workers, has been considered dangerous by Sladek and Kotlowski, and numerous alarming reactions of short duration have been reported. Scully[3] reports one case of death in an alcoholic three and one-half days after a small dose of typhoid vaccine intravenously, and advises us of two other cases dying after antimeningococcus serum; one, an arthritic, died from acute dilatation of the stomach, and the second, a typhoid case, from epistaxis and intestinal hemorrhage. Sladek and Kotlowski,[5] Eggerth,[6] and Biedl[7] report four cases of death from intestinal hemorrhage and uncontrollable epistaxis after comparatively small doses of intravenous typhoid vaccine.

Search of the literature has failed thus far to reveal a single anaphylactic shock with fatality directly attributed to the in-

[1] Frederick P. Gay: J. Lab. and Clin. M., St. Louis, 1915, 1, p. 18.
[2] Miller: Jour. Am. Med. Assn., Vol. XLIX, 1917, p. 765.
[3] Scully: Jour. Am. Med. Assn., Vol. XLIX, 1917, p. 20.
[4] Kibler and McBride: Jour. Infect. Dis., vol. 21, 1917, p. 18.
[5] Sladek and Kotlowski: Wien. klin. Wchnschr., 1915, 28, 889.
[6] Eggerth: Wien. klin. Wchnschr., 1915, 28, 209.
[7] Biedl, A.: Prag. Med. Wchnschr., 1915, 40, 53.

travenous injection of typhoid vaccine. The administration, however, has usually been in the hands of cautious, experienced men working in large clinics, where all aspects of the treatment are considered and controlled. This case plainly shows that the treatment is dangerous, that the first dose should be small and subsequent doses measured by the reaction of the patient to the first dose, and, finally, that the patient should be under close observation until the period during which anaphylactic shock may occur is surely over.

TREATMENT OF FRACTURES OF THE THIGH BY THE GASSETTE APPARATUS.

By GASTON HOUZEL, Médecin Aide Major 1re classe.[1]

[Published by the War Department of the French Republic.]

The principle of this apparatus for fractures of the thigh can be summed up in two words—traction, suspension. When employed conjointly these two conditions afford a solution to the problem of treating a war wound without interfering with the immobilization of the fragments. It is applicable, therefore, to all fractures of the femur, but is particularly noteworthy in war traumatisms for posterior lacerated wounds, which undergo daily inspection and irrigation. It is the only method by which a high fracture of the subtrochanteric type is easily treated.

DESCRIPTION OF THE APPARATUS.

It consists of:

1. A frame for suspension and traction.
2. An anterior suspension-cradle splint.
3. The necessary extension devices.

I. THE TRACTION-SUSPENSION FRAME.

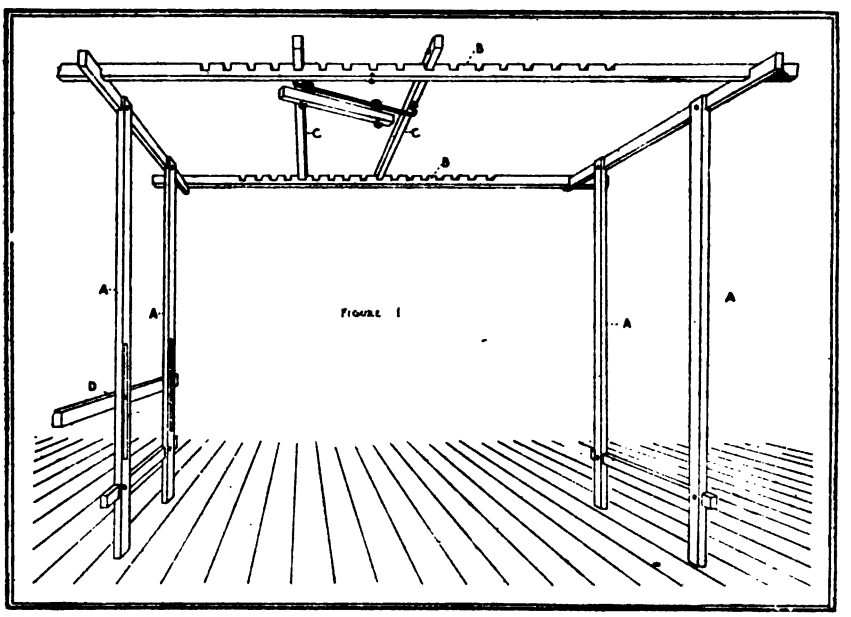
The idea of suspending a thigh fracture from a wooden frame is not original with Miss Gassette. As a matter of fact, the suspension trestle is the work of the British, who had already employed it in their hospitals long before the present war. The idea of suspending a thigh fracture belongs to them; an improved suspension from a trolley playing by two rollers on a wooden crosspiece was used in France more especially by Surgeon H. H. M. Lyle at the Jeuilly Ambulance (Dammartin).

Miss Gassette sought particularly in her model of a frame to produce a suspension device which would be available for all cases, whether of the upper or lower limb, a universal suspension which

[1] Translated by Medical Inspector J. S. Taylor, United States Navy.

could be constructed with little material, at small expense and which, through its very simplicity, would perform very efficient service.

The frame is composed of 14 parts, including the trolley (fig. 1). Let us take four uprights (*A*, fig. 1), secured to each other in pairs by transverse bars at top and bottom, securely bolted in place. The two squares thus formed are fastened to each other by two pieces of wood (*B*, fig. 1) as long as the bed, marked along their upper surfaces by a series of notches which receive and hold transverse crossbars. The latter (*C*, fig. 1), essential features of the structure to which the rail of the trolley is to be fastened by two large eyebolts, extend beyond the square of the frame. At the foot of the bed a third crosspiece (*D*, fig. 1) secured by bolts likewise projects beyond the frame, and these three crosspieces by being longer than the width of the bed permit the use of marked abduction of thigh or arm.



Traction-suspension frame.

II. THE ANTERIOR SUSPENSION-CRADLE SPLINT.

This is the wholly original feature of the device. It is the discovery which gives the apparatus its unquestionable superiority over all others. As a matter of fact, the immobilization of a fracture by means of a frame was originally obtained by a posterior metallic splint with or without a hinge at the level of the knee joint.

At the outbreak of the war Dr. Frank Gardner, modifying the Thomas apparatus, had in Dr. Blake's surgical service applied the

principle of a posterior apparatus hung from a trestle. After a prolonged study of the question Miss Gassette, who had acquired wide experience through her position as technical director of the Franco-American Committee Against Functional Loss of Power, was in a position to appreciate that this posterior splint was a source of pain to the wounded, especially in cases of subtrochanteric fracture. The suspension in these cases gradually induced an intolerable pressure from the metal frame upon the soft parts, especially at the gluteal fold, impairing the skin and liable to cause a slough.

Her idea was to turn this posterior splint around and swing the limb in a cradle to an anterior leg-thigh frame (fig. 2), to which

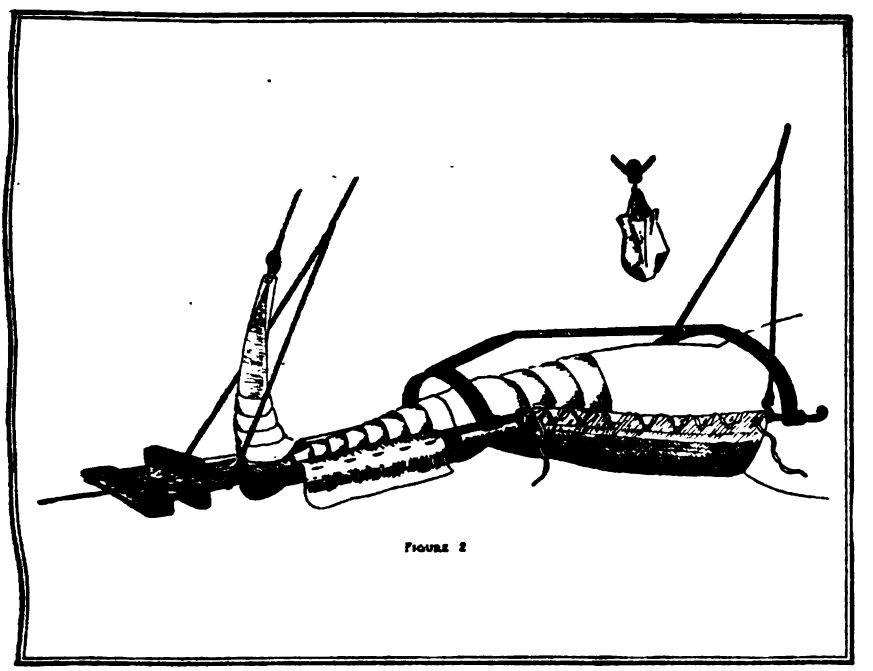


FIGURE 2

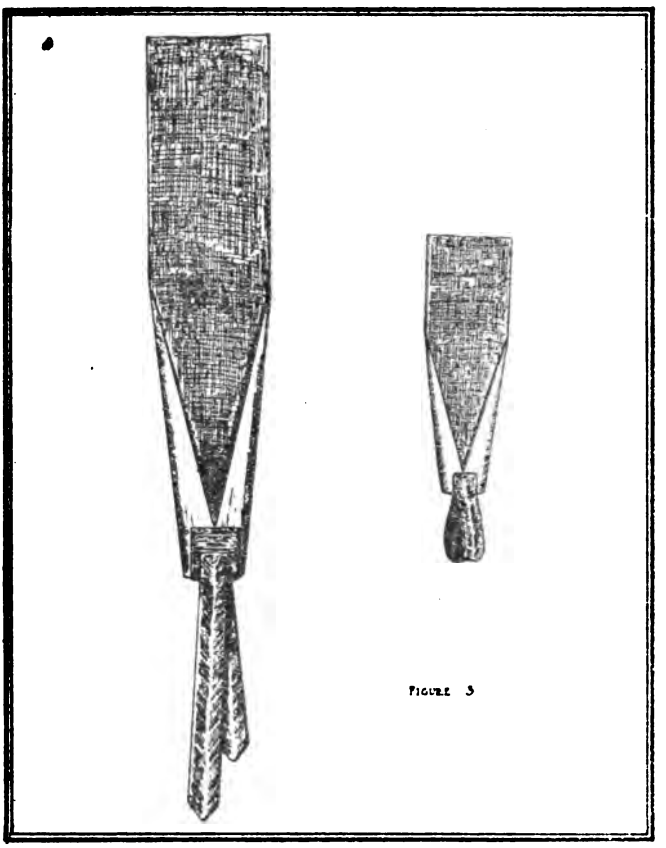
Suspension-cradle splint.

would be secured the bands supporting the fractured limb. In this way the suspension would be lashed to this rigid frame, which could even serve as a means of transportation by the aid of a few circular plaster of Paris bandages. This is actually the chief feature of the device, and we owe this happy modification to Miss Gassette, who has simply brought up to date an anterior metal frame which the American surgeon Hodgens employed in 1863–1865 in caring for the wounded of the War of Secession.

This anterior suspension-cradle splint swings from the crosspieces of the trestle by two sets of cord, which, running over the traveling

pulley, reach a system of counterweights represented by a canvas bag, into which sandbags weighing 1 kilo each are to be placed.

Furthermore, the splint at its distal extremity is terminated by a wooden crosspiece with a central perforation for the traction cord. Finally there is a wooden block, which, by Miss Gassette's arrangement, serves as an intermediate element to which are buckled and secured the extension bands.

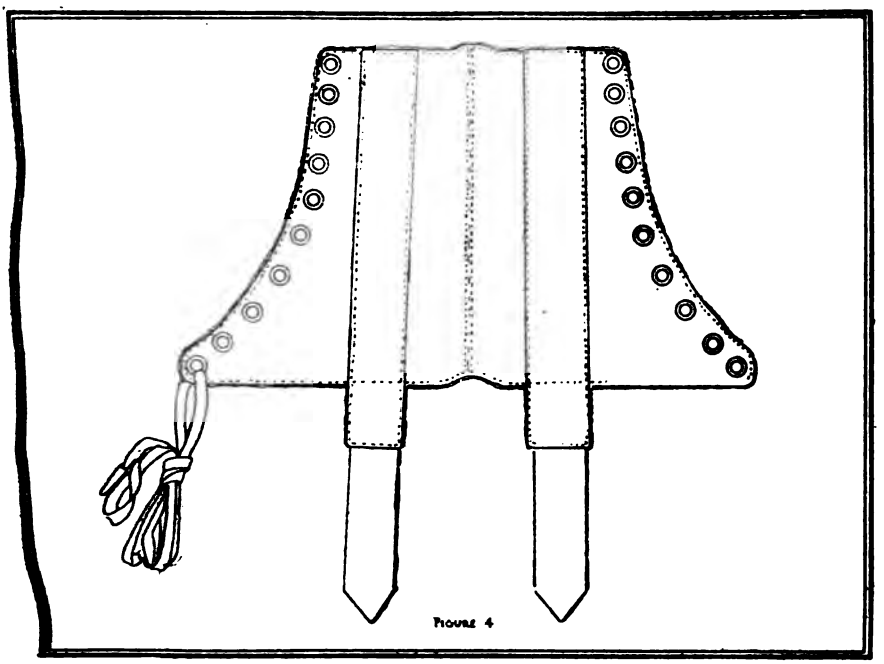


Extension device.

III. EXTENSION DEVICE.

This device constitutes one of the novel and interesting features of the apparatus. Up to Miss Gassette's time we used mainly adhesive bandages put on like the old diachylon of Tillaux. These had their disadvantages as regards the skin, were not available where there existed skin lesions of the leg, and, besides, had a tendency to become loose where such prolonged treatment was demanded. In the type which we are describing here extension can be made in two

ways. The commonest and best way is to use a form of lint bandage (*ouate*) such as Blake adopted from the start. This material has a fluffy nap which is very strong. It is to be cut in pieces 0.60 centimeter long and 0.25 centimeter wide. These bands narrow toward their extremities and end on each side in two straps (2 fingers' breadth wide), one of which goes to the intermediate board, the other being secured to the suspension splint (figs. 3 and 6). These bands, easy to put on and shaping themselves to the limb which they surround by imbricating their front and back edges, are made adherent to the skin along the length of the limb by a special glue



The gaiter.

called Heussner's glue or paste, of which the following is the composition:

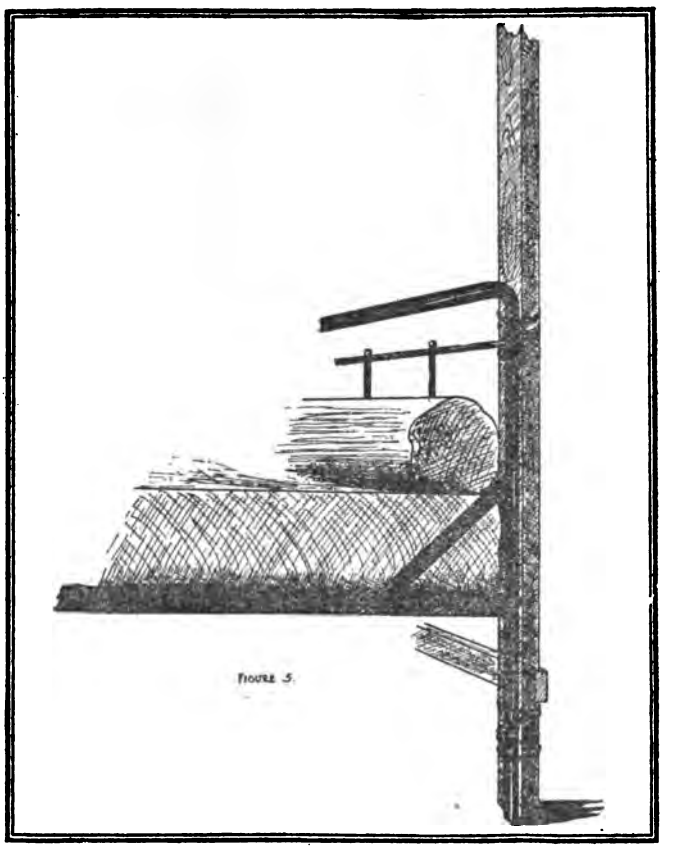
Rosin	60
Alcohol	50
Benzine	25
Venice turpentine	5

Where there are complicating wounds of the leg, one simply cuts windows in the strips of lint through which dressings can be done. On the other hand, if the wounds are of considerable extent the strips can be replaced by another method of extension, namely, the gaiter (fig. 4), which envelops the foot and, like Ombredanne's boot, is laced up in front along the median line.

METHOD OF EMPLOYING THE APPARATUS.

I. SETTING UP THE FRAME.

Before any actual handling of the thigh, set up the wooden frame, one section at the head and one at the foot of the bed, firmly tied with rope, and unite them to each other by the two bars which complete the frame. The three crossbars (*C* and *D*, fig. 1) are put on



Frame secured to bed.

last of all. Remember to raise the foot of the bed with stout wooden blocks about 25 centimeters high.

II. APPLICATION OF THE EXTENSION AND SUSPENSION DEVICE.

(*a*) Extension will usually be made, as we have said, by bands of lint put on with the fluffy side next to the skin.

Raise the leg; scrub the limb with soap and water and a brush; go over the skin with ether or alcohol and then with a large brush

spread the Heussner paste on smoothly. Apply the lint strips, imbricating their edges front and back, and remembering an important point, to prevent their adhering at the level of the malleoli, for sloughing will inevitably result from deterioration of the skin subjected to constant traction over the bony layer directly beneath it. The greater portion of the surface of the limb will be covered in to a point a little above the upper limit of the lower fragment. At the foot the two strips are separated from each other by the width of the

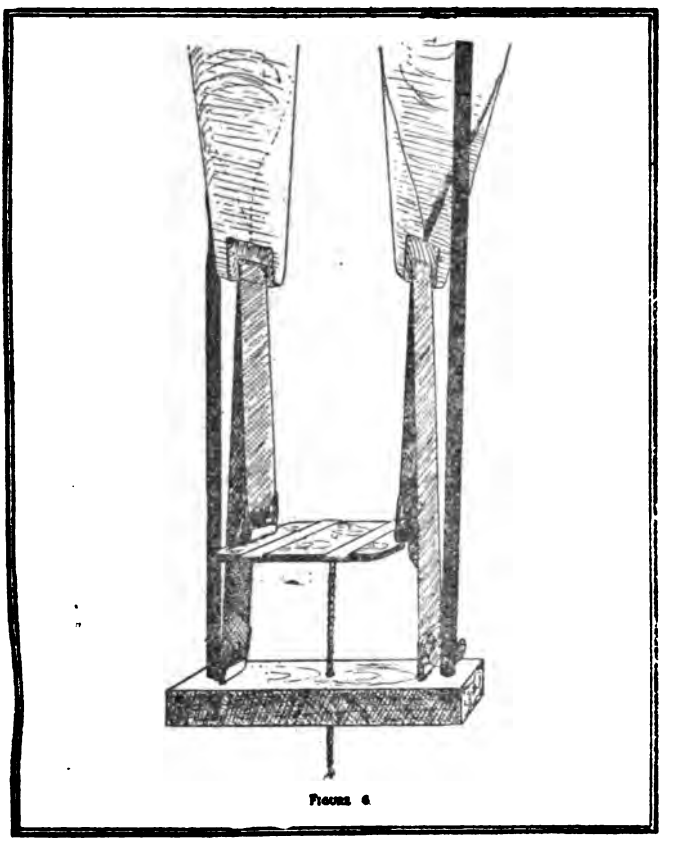


FIGURE 6

Crosspiece and intermediate wood piece.

intermediate wood piece, to which are fastened two of the extension straps. The other two are fastened to the crosspiece of the splint (fig. 6).

When the strips are in place the leg is surrounded by a soft bandage of some crêpelike material, which secures intimate contact during the drying period. Besides this it is absolutely necessary to wait at least an hour before beginning the extension. It is advisable therefore to let the latter step be contemporaneous with the last operative

procedures and to take advantage of the anæsthesia to complete the extension, which is always painful at the moment when the leg is immobilized to put on the bandages.

(*b*) Suspension, on the other hand, can only be applied when the patient is in the bed. The splint is placed above the limb while under the limb are slipped the suspension bands. These will consist for the leg of rather long compresses or a sheet of lint secured with pins to each side of the splint. For the thigh Miss Gassette employs a cradle of a single piece of material containing some rubber reinforced in its long diameter by whalebone and at the sides secured by lacings to the two rods of the metal splint. By unlacing one side of the

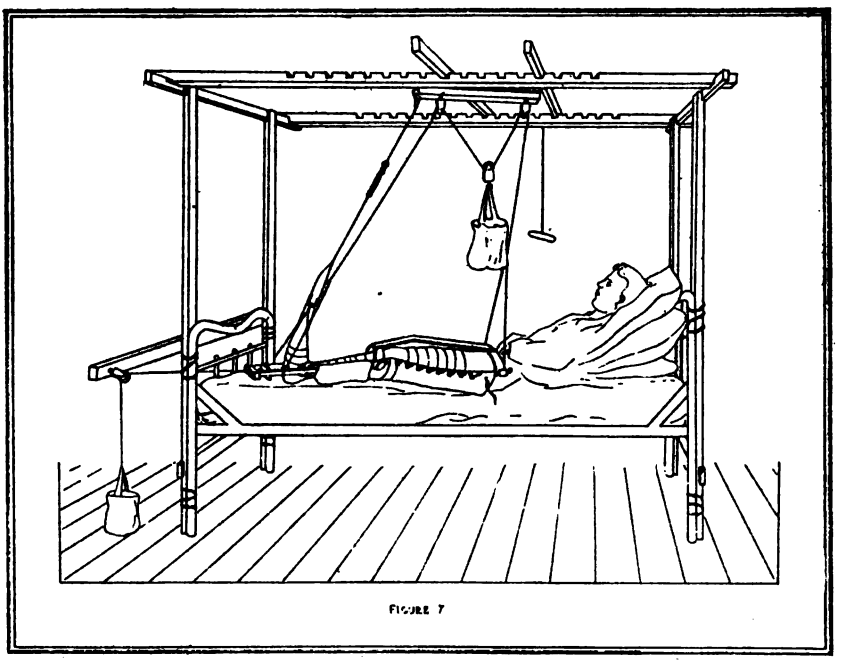


FIGURE 7

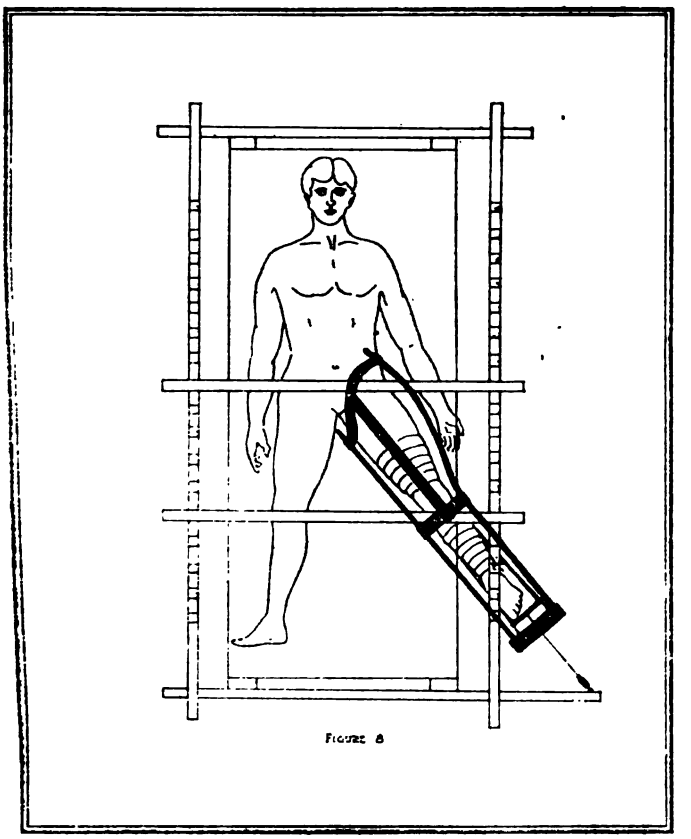
Extension, counter-extension, and suspension complete.

cradle without disturbing the traction one has surgical access to the whole posterior of a thigh absolutely immobilized even during the course of the most complicated dressing.

To complete the installation of the suspension apparatus traction must be instituted at once. The strips are buckled to the intermediate board, and the traction cord passes through the foot of the apparatus and runs to its pulley. The latter is secured on the cross-bar of the frame (fig. 7) more or less in abduction, according to the height of the level of the fracture. The traction cord turns over the pulley and ends in a canvas bag, in which is to be placed a weight of

6 to 15 kilos, according to the clinical features of the case and the age and especially the muscular development of the patient.

As for the suspension, properly so-called, it requires the most careful adjustment of the two transverse bars of the trestle. They must be so placed as to allow the trolley to travel parallel to the principal axis of the limb, and the higher up the seat of the fracture the nearer the head of the bed must the trolley be moved so as to obtain more counter-extension. The two eyebolts for the attachment of the trolley,



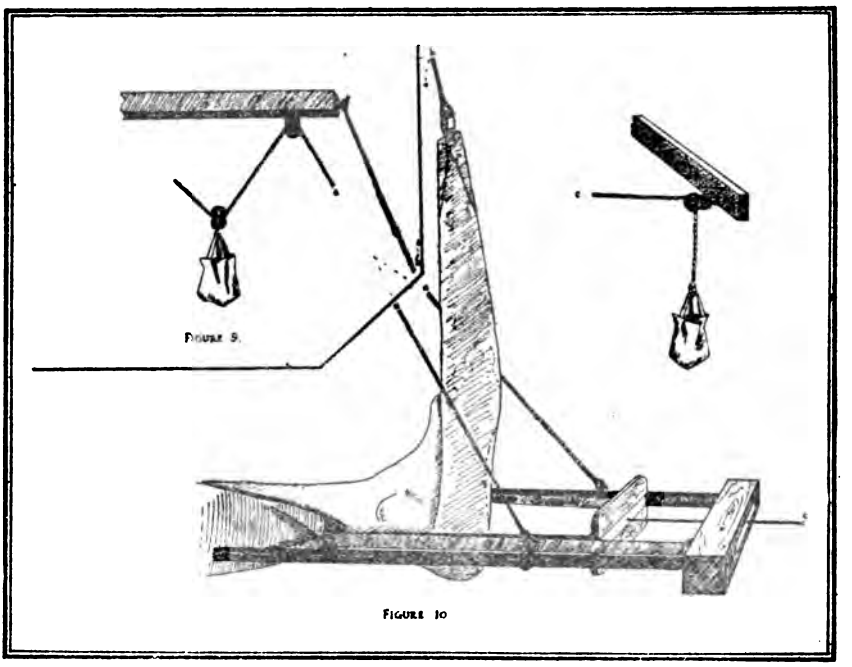
Abduction.

each on its own transverse bar, determine the degree of abduction of the limb.

Having fixed the trolley, screw in an eyebolt at 0.10 centimeter from each end of the wooden bar which it supports, fasten a pulley to each end, and, securing the cradle splint by two cords, one the upper crural, the other the lower leg cord, which a little adhesive material will secure to its hooks of attachment, have the two cords pass through their respective pulleys in the trolley. They should

meet and be spliced into one cord to support a counterweight represented by a canvas bag, which a traveling pulley will always maintain in an intermediate position between the two forces acting in oposite directions (fig. 9). For actual counterweight use from 6 to 8 kilos and by experiment obtain a state of equilibrium such that the leg shall occupy a horizontal plane slightly lower than that which traverses the traction pulley, for otherwise the extension will be defective.

But the apparatus thus set up is still incomplete, for it does not provide for maintaining the foot at a right angle, so as to counteract the tendency to foot-drop. This is another of the improvements



Extension and suspension.

which we owe to Miss Gassette, who, having a practical appreciation of Dr. Keating's idea of suspending the patient's foot to the trolley, has enabled us to combat successfully this great stumbling block in the treatment of fractures of the thigh by continuous extension. The first step toward avoiding the equinus position was to employ a right angle iron wire. Then, a spring device of the Harley type was used. The simplest plan is to fasten a band to the plantar surface with Heussner's glue and suspend it from an eyebolt screwed into the end of the wooden bar which carries the trolley (figs. 7 and 10).

This apparatus thus installed has only good points and furnishes a means of complete and continuous extension, thanks to the suspen-

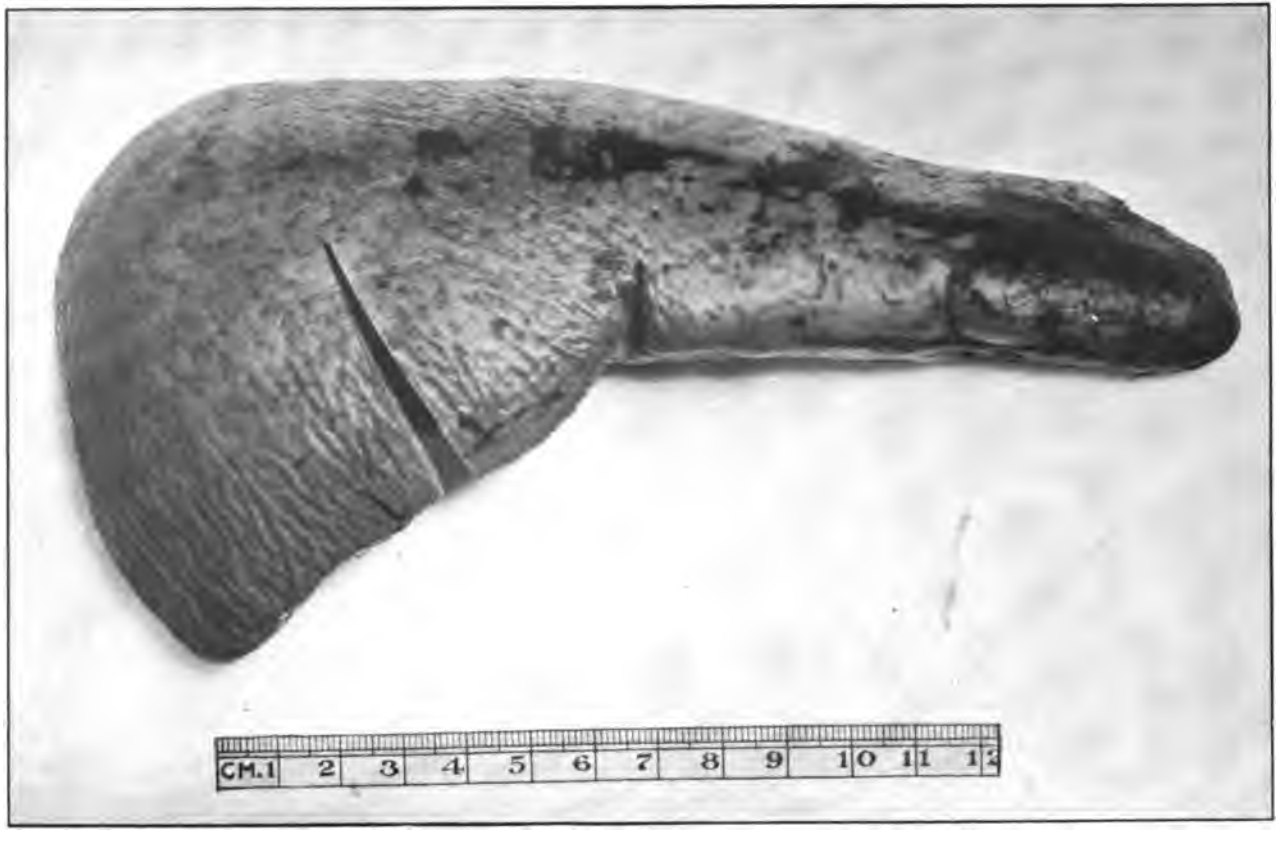


PLATE 1.

sion, which avoids the clinging to the plane of the bed and the consequent reduction of traction in the ordinary linear devices of the Tillaux type. The traction is continuous, because the arrangement allows wounds to be dressed and the patient to be cleaned and bathed at the same time, while sloughing is prevented. By means of a small wooden billet suspended from the trestle for the patient to grasp, he can lift himself and is thus able to endure more easily the months of immobilization demanded by his injury.

We have shown in the above description that this apparatus resulted from the combined efforts of several English and American surgeons whose sagacity and inventiveness long ago attacked the problem of treating complicated fractures of the thigh, but it is first and foremost the work of Miss Gassette, who, by hitting upon the scheme of a suspensory trestle, of a counterweight, of an anterior suspension-cradle splint, of extension, has made this apparatus peculiarly her own and produced an arrangement which comes very near being perfect.

For 18 months the Gassette pattern has been used by our forces and has stood the test, and now positive results testify to its value. It is in daily use in the surgical service of Cochen, and it is to express the highest appreciation of its efficiency that we here summarize its merits by quoting the opinion of Professor Quenn, who considers it unquestionably superior in every way to all other devices for the treatment of compound fractures of the thigh.

A PATHOLOGICAL STUDY OF SPLENIC ANEMIA (BANTI'S DISEASE).

By F. W. Hartman, Assistant Surgeon, United States Navy.

R. S., age 24, private, U. S. M. C., was admitted to the United States Naval Hospital, Washington, D. C., July 20, 1917, with diagnosis undetermined. There was nothing remarkable in the family history. The personal history was negative except for a chancroid in October, 1914. The patient's illness dates back to November, 1914, while on duty in Mexico. The constant complaint from that time was of pain and discomfort in the epigastrium and right upper quadrant. This was always associated with nausea, vomiting, diarrhea, and irregular fever. Of the 32 months' illness approximately 16 months had been spent in different hospitals. The patient underwent a cholecystostomy with three weeks' drainage, followed by an operation for ventral hernia, in 1915. In 1916 he was given a diagnosis of typhoid fever, but after four months there was only slight change in his condition. During this period he was told that he probably had a liver abscess, as both his liver and spleen were enlarged.

On admission here the patient's trouble, as he stated it, consisted of "weakness, pain in the stomach, loss of appetite, and diarrhea." There was an irregular fever, usually rising in the afternoon or early evening, going as high as 103 F. at times.

Physical examination.—The patient was very thin, and his face had a pinched expression. Weakness and malaise were very evident. The complexion had a yellowish tint, and the conjunctivae were slightly jaundiced. The teeth were in good repair, containing numerous fillings and crowns.

Thorax.—Heart; cardiac dullness normal size. There were no thrills or murmurs.

Lungs; resonant throughout, no râles.

Abdomen.—There was some rigidity of the abdominal muscles, with pain on deep pressure over the epigastrium. The liver dullness extended from the third interspace to 4 centimeters below the costal margin on the right side.

The spleen was easily felt rising and falling with respiration as a firm rounded mass reaching 7 centimeters below the costal margin during full inspiration.

Genito-urinary system.—Negative.

Glands.—There was no general or local glandular enlargement.

Sputum.—Negative for tubercle bacilli.

Urine.—Small amount of albumen, a few hyaline and granular casts.

Wassermann.—Negative.

Blood.—Previous to operation the hemoglobin per cent as estimated by the Tallquist method averaged about 75. The red count varied from 3,700,000 to 4,500,000 and the white count ranged from 4,000 to 4,600. Differential count of 200 cells:

	Per cent.
Lymphocytes	23
Large mononuclears and transitionals	8.5
Polymorphonuclear leucocytes	64
Eosinophiles	2
Mast cells	1
Myelocytes	1
Blasts	.5
	100

In addition to the moderate anemia, leucopenia, and relative lymphocytosis, many of the polymorphonuclear leucocytes showed a dense granulation, which tended to be basophilic, and band-form nuclei, and there was 1 per cent of typical myelocytes and a few very large mononuclear cells with blue staining vacuolated protoplasm and lighter staining nucleus.

X-ray.—The picture of the chest showed nothing pathological. As seen in plate No. 2, the spleen threw a remarkable shadow, com-

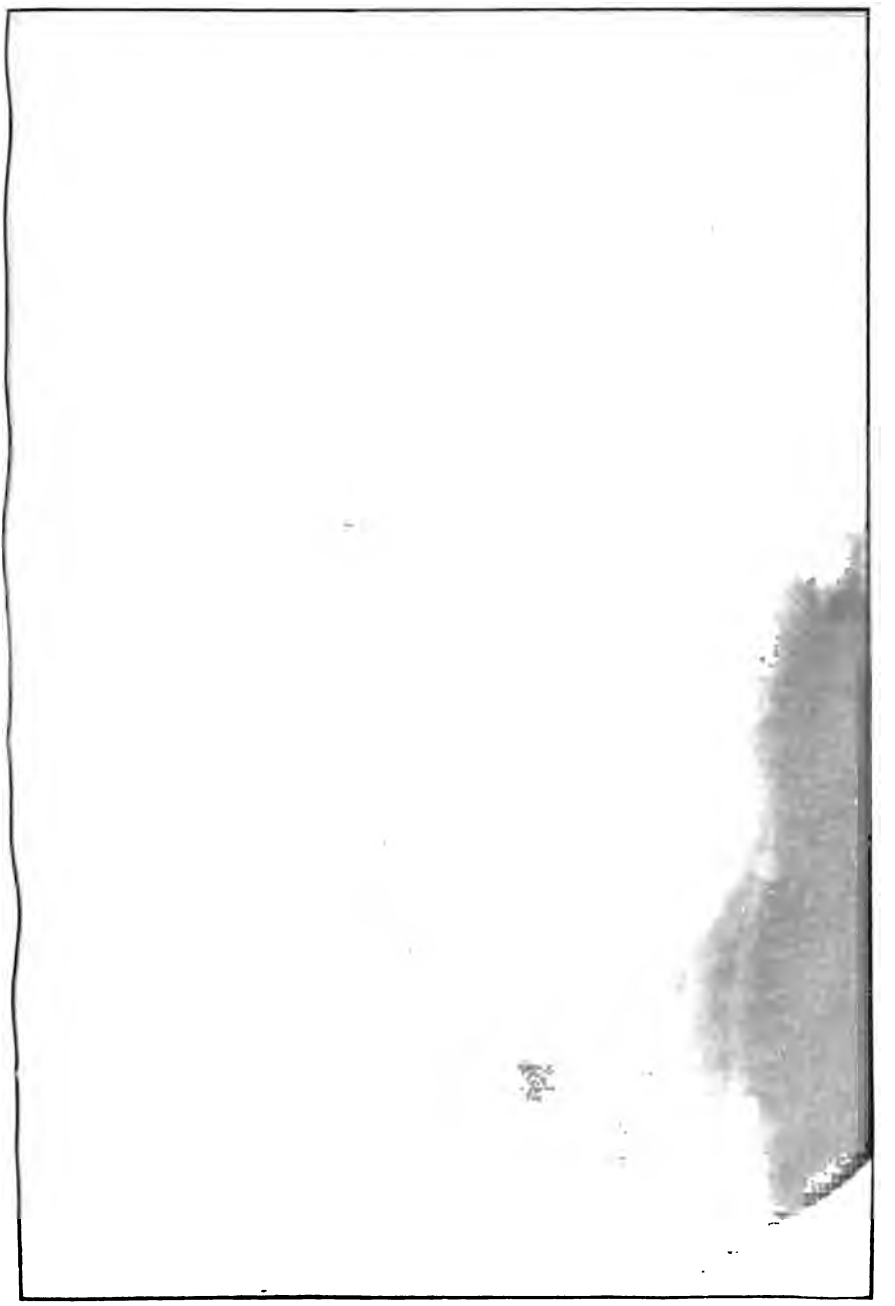


PLATE 2.

Hartman—Splenic Anemia.

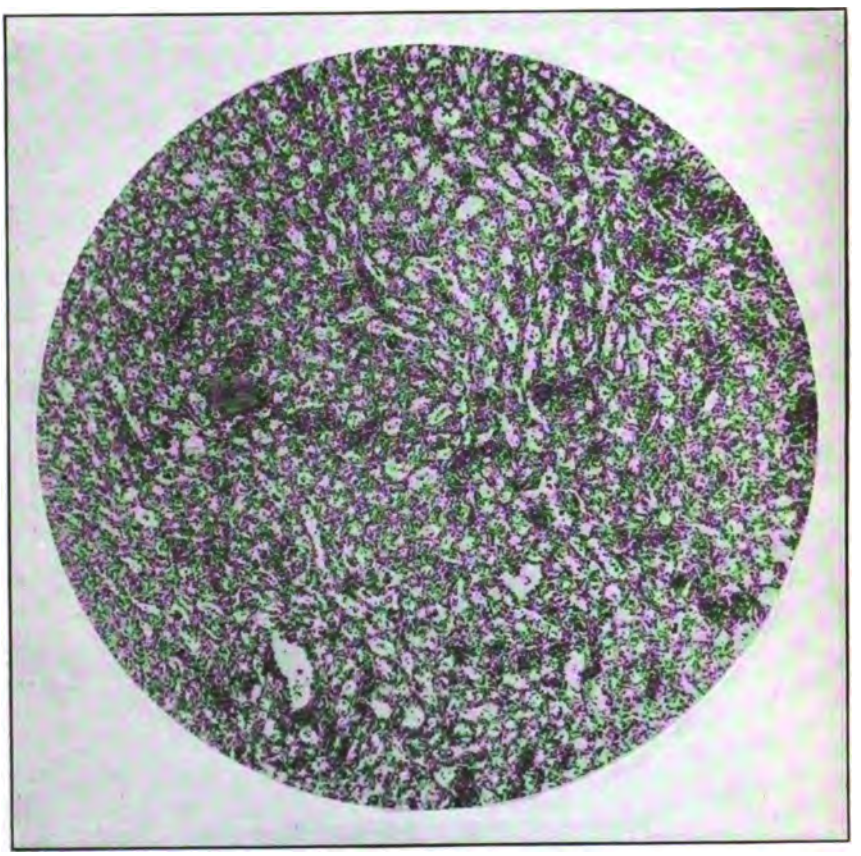


PLATE 3.

The specimen consists of a spleen about five times the normal size, measuring 18½ by 11 by 8½ centimeters and weighing 732 grams. The capsule is smooth except for a few wrinkles. Several large hemorrhagic areas appear just beneath the capsule. Near the hilus is a small section of adherent pancreas and several accessory veins enter the upper pole. Two deep notches cut the anterior border (pl. 1). In consistency it resembles a solid rubber ball being firm and markedly resilient.

On section the surface has the peculiar smoothness of a compact fibrous tissue. The edges of the sections are sharp and well defined; the blood vessels are gaping, as in a liver section; and the color is a grayish red. In the fresh specimen neither the trabeculae nor the malphigian corpuscles are seen, but in the preserved specimen the latter are seen as lighter gray dots, which in some areas are surrounded by a narrow zone of reddish brown tissue.

Miscroscopic.—As seen in plates Nos. 3 and 4, the tissue is scarcely recognizable as spleen. The capsule is thickened, some areas being infiltrated with blood cells. Large blood spaces walled by comparatively dense fibrous tissue and lined by endothelial cells, many of which have broken away, replace the normal adenoid tissue. The malphigian corpuscles show only loosely placed lymphocytes at the periphery with marked fibrosis at the center (pl. No. 4). The trabeculæ are relatively few in number, but thicker than normal. The picture is thus one of hyperplasia of the reticulum at the expense of the lymphoid elements of the spleen. It would appear that the function of the spleen is interfered with, as there is no phagocytosis of red blood cells or blood pigment.

Now, two months and a half after operation, the patient returns free from all his former symptoms. His appetite is excellent and he has gained 20 pounds in weight. He is still pale, but the mucous membranes have a good color. Blood examination: Hæmoglobin, per cent 90; white cell count, 12,800; red cell count, 4,900,000. Differential count:

	Per cent.
Polymorphonuclear leucocytes	65
Lymphocytes	20
Large mononuclears and transitionals	5
Eosinophiles	9
Mast cells	1
	100

There are many band-form nuclei in the polymorphonuclears with dense granulation of the protoplasm. Most of the lymphocytes are of the large type and the protoplasm containing no granules stains a steel blue. Increasing eosinophilia with continued leucocytosis is striking. However, these are the usual blood changes following splenectomy.

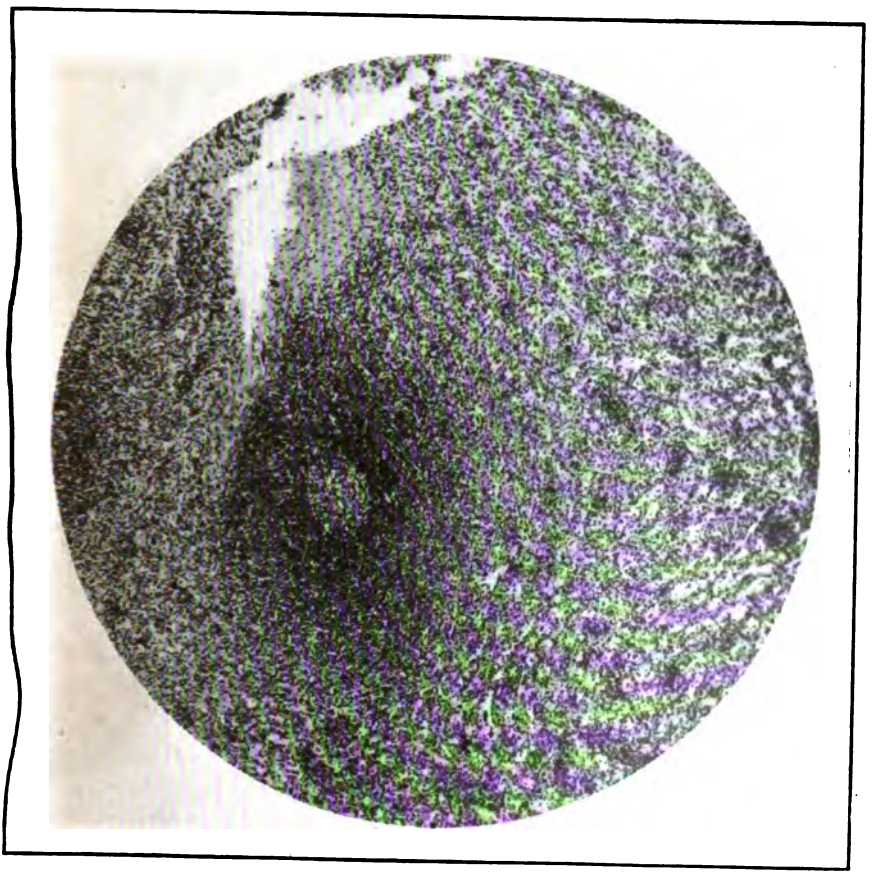


PLATE 4.

The interest in this case centers first about the unvaried set of symptoms extending throughout the disease and the difficulty of the interpretation of these symptoms. With the fibrous perisplenitis found at operation and the complete recovery after operation it would seem that the symptoms were the result of adhesions to and pressure upon adjacent viscera and the diaphragm.

Second. Blood changes before operation, which have been often described with Banti's disease though not universally accepted as diagnostic of the condition and changes after operation well recognized as the result of splenectomy.

Third. The clearness with which the spleen shows in the X-ray picture, although this is not remarkable when we consider the fibrous structure of the organ and the large amount of blood contained in its dilated sinuses. X-ray examination may prove to be a valuable aid in the diagnosis of this disease.

Fourth. The gross and microscopic pathology is an intensified picture of that commonly reported in Banti's disease. Seldom has the pathology proven such a distinct entity as in this case.

THE CARE OF CONTAGIOUS CASES AND THEIR IMPORTANCE TO THE UNITED STATES NAVY.

By M. F. Gates, Medical Director, United States Navy.

Through the courtesy of Dr. D. L. Richardson, superintendent of the Providence City Hospital, several medical officers and nurses of the staff of the United States Naval Hospital, Newport, R. I., have been given opportunities to study the work, and by authority of the Surgeon General seven nurses have served tours of duty of two weeks each in the actual care of patients in that hospital. It is believed that this experience will be of great value to the Navy.

The fundamental idea which governs the care of contagious cases is definite and the technique is simple and easily understood, but for its efficient carrying out it requires certain special facilities and extremely conscientious execution by all who come in contact with patients. The technique is based on the principle that contagions are rarely, if ever, air borne, but that transmission is by contact, directly or indirectly. The importance of this and its logical conclusions is certainly not generally appreciated by physicians, either civil or military.

It may be of value to exemplify from recent experience at this hospital the cost to the service in morbidity and mortality of infections, and it is believed that this experience will be emphasized by that of others. During the first seven months of the current year admissions to this hospital numbered 1,529, and of these 802 were

due to the following-named diseases: German measles, measles, mumps, chicken-pox, scarlet fever, diphtheria, cerebro-spinal meningitis, pneumonia (lobar and broncho-), and suppurative pleurisy.

During that period 47 deaths occurred, the causes being as follows:

Cerebro-spinal meningitis	2	Wound, gunshot	1
Pneumonia, lobar	18	Appendicitis	1
Pneumonia, broncho-	13	Cardiac dilatation, acute	1
Pleurisy, suppurative	10		
Tuberculosis, pulmonary	1		47

Out of the 47 deaths 44 were due to infectious diseases. In 18 the fatal illness followed, and in most of them was distinctly a sequel to diseases too often very lightly considered, measles and German measles. Cases of German measles have for some reason been unusually severe, and many patients who did not develop sequelæ have been extremely ill.

A more thorough appreciation of the lessons taught by such experience must lead to improvement of technique in handling cases and especially to increase at naval hospitals and elsewhere of essential facilities for segregation, isolation for observation, and for prevention of cross infection. The following brief quotations from the Providence City Hospital Manual of Aseptic Technique illustrate the governing principles:

Anything which has come, directly or indirectly, in contact with a patient or an infected area is contaminated.

Infectious diseases are transmitted by actual contact, direct or indirect. Indirect contact takes place through a contaminated carrier. Air transmission is so rare that it need not be considered of practical importance, except that nurses must avoid patients coughing into their faces.

A unit is an area which represents a separate and distinct infection; such an area may comprise a single bed or an entire room.

Medical asepsis aims to confine each different infection to a physically separate unit. The chief object of the whole aseptic technique is to prevent the transmission of infection from one unit to another.

Gowns are worn by nurses for any work which involves intimate contact with the patient. The gown is taken from the hook and slipped over the arms in such a way that the nurse is not contaminated. After finishing her work the nurse scrubs her hands and folds the gown down the middle, clean surface inside, and hangs it on the hook in such a way that it can be slipped on again without contamination. Finally the nurse washes her hands again. If no gown is worn, the nurse is careful that none of her clothing shall touch the bed or anything in the patient's room, and only contaminates her hands or forearms, which can be scrubbed with soap and water. Gowns are changed at least twice a week and oftener if soiled with secretions.

SUMMARY OF RULES FOR NURSES.

1. Keep fingers, pencils, pins, labels, and everything of the sort out of your mouth.
2. Wash your hands frequently and always before leaving the ward and before eating.
3. After handling a patient don't touch your face.

4. Don't allow patients to cough or sneeze in your face.
5. Don't kiss a patient or allow him to touch your face.
6. Don't eat anything that a patient may wish to give you.
7. Keep and use your own drinking glass.
8. Change your uniform when entering or leaving the ward.
9. Stay out of doors as much as possible and sleep with your window open.
10. Remember that infectious diseases are taken and carried by *contact*, not by air transmission.

The essence of the technique of medical asepsis is: *Touch nothing pertaining to the patient except with your hands and then scrub your hands carefully.*

In logically carrying this out one finds that many things have problems of their own—the bed, the food tray, the water-closet, the door knob, and especially the washbasin and its fixtures.

There is reason to hope that in future contagious wards of naval hospitals—and what ward of a naval hospital may not at any time be a contagious ward—will be plentifully supplied with the necessary equipment, especially with foot-controlled washbasins, to permit of faultless medical aseptic technique in the care of contagious cases.

This, with thorough indoctrination and conscientious execution, will save many lives.

	Remaining from 1916.	1917														
		January.		February.		March.		April.		May.		June.		July.		
		A. and RA.	DD.	A. and RA.	DD.	A. and RA.	DD.	A. and RA.	DD.	A. and RA.	DD.	A. and RA.	DD.	A. and RA.	DD.	
German measles		2	0	68	0	55	0	48	0	189	0	130	0	32	0	A. 524
Measles		0	0	3	0	1	0	5	0	24	0	21	0	8	0	A. 62
Mumps	1	0	0	1	0	1	0	3	0	14	0	24	0	24	0	A. 68
Chicken-pox		0	0	1	0	0	0	0	0	0	0	1	0	0	0	A. 2
Scarlet fever		0	0	0	0	0	0	0	0	1	0	1	0	1	0	A. 3
Diphtheria		0	0	0	0	0	0	0	0	5	0	1	0	0	0	A. 6
Meningitis, cerebro-spinal		0	0	0	0	0	0	1	0	5	[1] 2	1	0	0	0	A. 7 DD. 2
Pneumonia, lobar	5	6	4	6	2	7	1	10	0	20	6	15	[1] 5	6	0	A. 75 DD. 18
Pneumonia, broncho-		0	0	0	0	2	0	1	0	20	10	8	[1] 3	0	0	A. 31 DD. 13
Pleurisy, suppurative		0	0	1	1	2	0	4	2	5	0	18	6	0	1	A. 30 DD. 10
Total admissions result of infections		8	0	80	0	68	0	72	0	283	0	220	0	71	0	802
Total deaths from and following infections		0	4	0	3	0	1	0	2	0	18	0	14	0	1	43
Deaths from other causes			0		0		1		0		2		1		0	4
Causes:																
Tuberculosis, chronic, pulmonary			0		0		1		0		0		0		0	1
Wound, gunshot L chest			0		0		0		0		1		0		0	1
Appendicitis, acute			0		0		0		0		1		0		0	1
Dilatation, acute cardiac			0		0		0		0		0		1		0	1
Total admissions all causes	62	54		124		147		150		443		315		225		1,529
Total deaths, all causes			4		3		2		2		20		15		1	47
Total sick days		3,199		2,377		3,354		3,122		7,013		8,515		7,219		34,799
Reserve force (included above), admissions, re-admissions, and deaths	0	0	0	0	0	0	0	27	0	88	[1] 1	69	[1] 2	36	0	A. 220 DD. 3

[1] Deaths of Naval Reserves.

Following German measles:	
Pleurisy, suppurative	2
Pneumonia, broncho-	7
Pneumonia, lobar	4
Following measles:	
Pleurisy, suppurative	1
Pneumonia, broncho-	3
Pneumonia, lobar	1
	18

CONTAGIOUS HOSPITALS.

By R. K. Joslin, Assistant Surgeon, United States Naval Reserve Force.

The proper control, isolation, and nursing of patients having a communicable disease is of the greatest importance, especially at the present time, to the medical men of the Navy. With both barracks and camps filled with men from all parts of the United States, carriers, as well as mild and missed cases, are prone to be found among them. It is therefore desirable to have buildings in which these cases can be properly cared for, as well as isolation wards to control those cases having doubtful or undetermined diagnosis. In the past 25 years much has been learned to increase our knowledge of the mode of transmission in contagious diseases. To quote D. L. Richardson, M. D., superintendent of the Providence City Hospital:

> The problem of controlling infection resolves itself, then, into measures for preventing the transference of secretion or excretion from the sick to the well, either by direct or indirect contact. Lord Lister taught surgeons that clean operative wounds were possible by employing "antisepsis." The asepsis of to-day is Lister's "antisepsis," without the antiseptic spray to sterilize the air. Asepsis will do for the medical care of patients suffering from infectious disease what it has done for surgery.

To enable both the medical and nursing personnel to properly carry out the simple technique required in aseptic fever nursing, wards having special features and equipment are necessary, since the older type of contagious hospitals is inadequate and unfitted for its proper control.

In 1888, Grancher, of Paris, began the work which paved the way to the building of the Pasteur Hospital, holding 120 patients housed in two 2-story buildings, and completed in 1900. At a later date nglish physicians adopted aseptic technique, and similar hostals were constructed for contagious diseases. Ten years later, r. Charles V. Chapin, Superintendent of Health, city of Providence, . I., who had visited the hospitals of both France and England, as able to have the Providence Hospital constructed upon plans dified to provide for the most modern medical asepsis.

The Providence City Hospital consists of a group of buildings having a scarlet-fever ward, diphtheria ward, isolation ward, tuberculosis ward, administration building, service building, power house and laundry, and an ambulance station, as shown in figure 1.

The diphtheria and scarlet-fever wards are similar, both buildings being two stories high, the first and second floors planned alike. By adopting both the "barrier" and unit system, 100 patients can be accommodated in these two buildings (fig. 2).

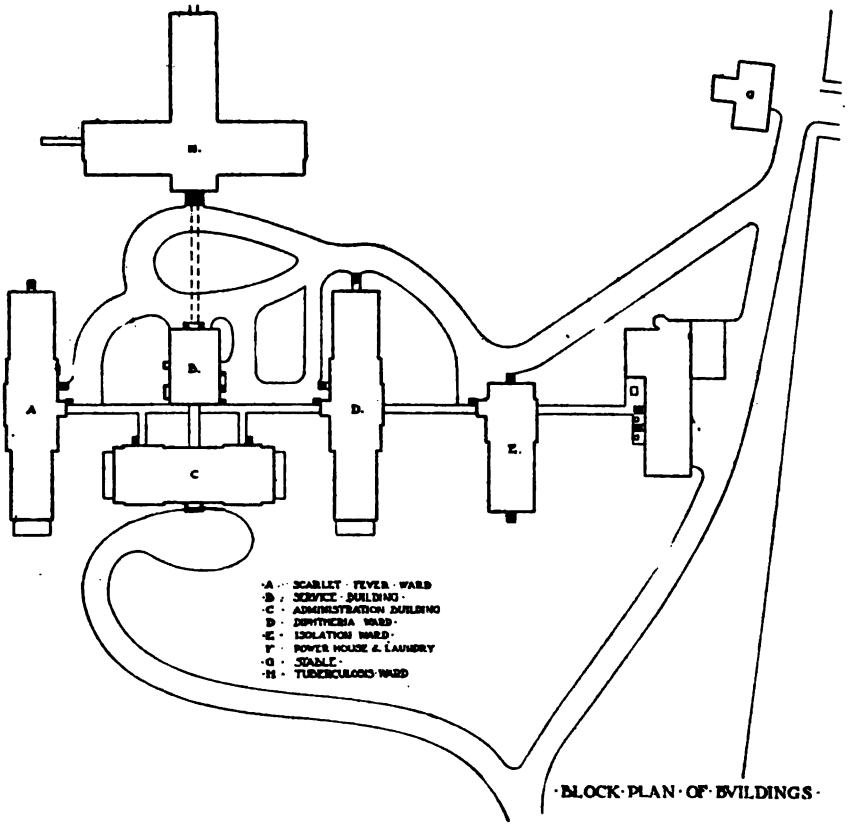
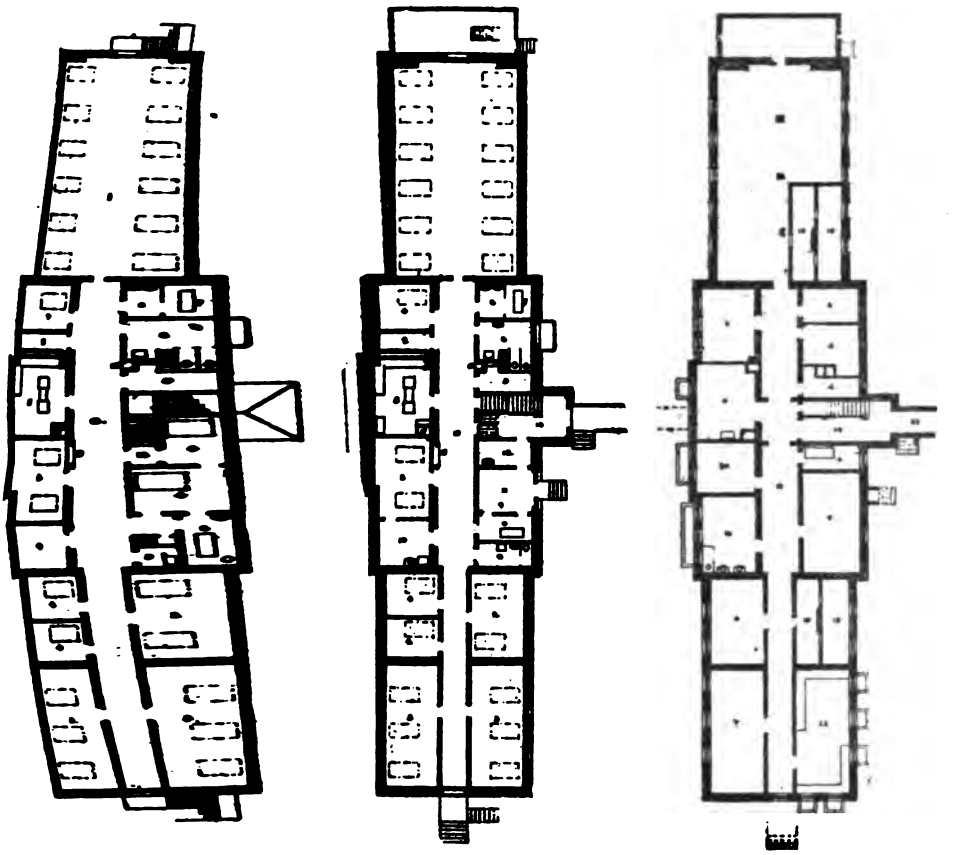


FIGURE 1.

The isolation ward, first floor, has 11 separate units. One to three bed units are located on the second floor, making a total capacity of 24 beds in this building. This ward is of special interest to us, as it is constructed on a unit or cubical plan and can be used to house all contagious cases. Similar temporary wards can be easily erected along these lines as an addition to the regular naval hospitals (fig. 3).

A group of buildings has been planned, modified from the isolation ward of the Providence City Hospital, consisting of an administra-

tion building and two wards holding 76 beds, with room for three additional wards, which would extend the hospital capacity to 188 beds. The size of the buildings and number of wards was planned to



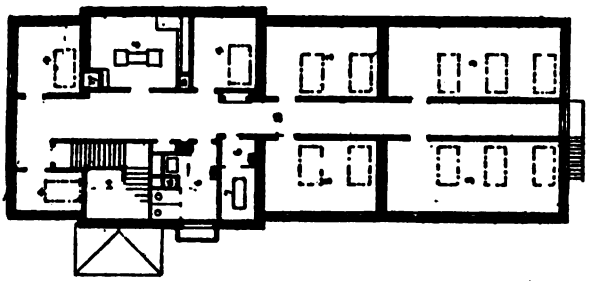
SECOND FLOOR. FIRST FLOOR. BASEMENT.

FIG. 2.—DIPHTHERIA WARD.

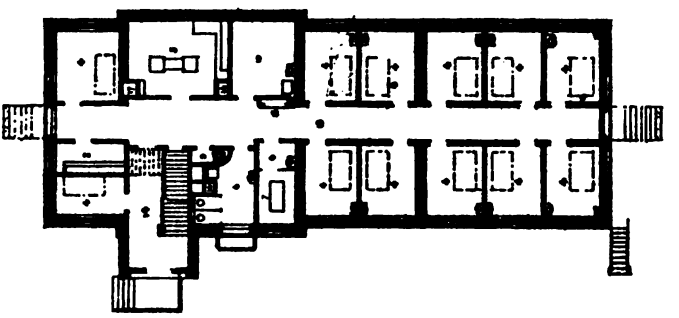
(Scarlet-fever ward similar.)

1. Twelve-bed ward.
2. Two-bed ward.
3. Three-bed ward.
4. Room.
5. Diet kitchen.
6. Lavatory.
7. Bath.
8. Linen closet.
9. Closet.
10. Operating room.
11. Examining room.
12. Robing room.
13. Corridor.
14. Stair hall.
15. Medicine closet.
16. Dryer.
17. Dumb waiter.
18. Chute.
19. Heating chamber.
20. Patients' clothes room.
21. Nurses' clothes room.
22. Laboratory.
23. Tunnel.

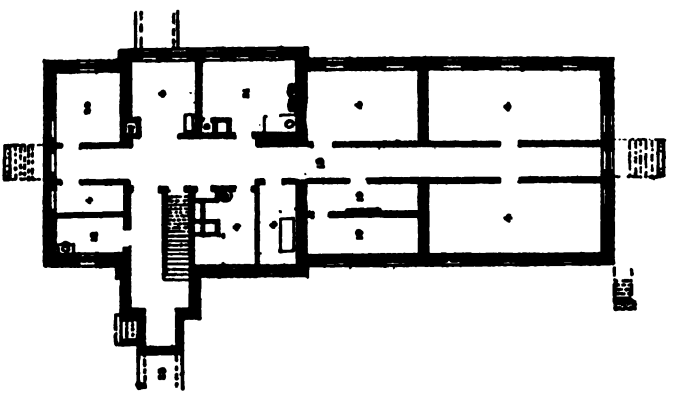
it conditions at the Newport Naval Hospital. The situation, num-
r, and size of buildings would in each case depend on the available
and and the number of patients to be accommodated. Buildings are



SECOND FLOOR.



FIRST FLOOR.



BASEMENT.

FIG. 3.—ISOLATION WARD.

2. Two-bed ward.
3. Three-bed ward.
4. Room.
5. Diet kitchen.
6. Lavatory.
7. Bath.
8. Linen closet.
9. Closet.
10. Operating room.
11. Examining room.
12. Robing room.
13. Corridor.
14. Stair hall.
15. Medicine closet.
16. Dryer.
17. Dumb waiter.
18. Chute.
19. Heating chamber.
20. Patients' clothes room.
21. Nurses' clothes room.
22. Laboratory.
23. Tunnel

proposed, with space to add three more wards, if necessary, one administration building being sufficient for a group of five wards. All buildings one story high to be heated and lighted by a central power and heating plant from the main hospital. Food prepared in the main hospital kitchen is brought in food carts to the diet kitchen, from which it is served to each ward.

The administration building, 81 by 30 feet, has a central corridor, on one side of which is an office room for nurses with a separate lavatory and shower bath, which would be available for the female nurses in charge of the ward, and also a dispensary, which is large enough to serve both the purpose of a pharmacy and laboratory combined, where specimens could be examined without bringing them to the main hospital. The examining room and usual store and linen rooms are also located in this building, one storeroom being used for the storage of patients' clothing. The examining room, 12 feet 4 inches by 11 feet, is equipped with metal table, one small bedside table for stethoscope, head mirror, throat sticks, etc., several metal chairs, small metal wall cabinet, and a lavatory operated by foot-levers, with soap and nail-brush containers for the proper washing of the hands after the examination of each patient. Two large ground glass windows give the best available light, a matter of the greatest importance in this room. Next to the examining room are two locker rooms, equipped with metal lockers for the ward and service uniforms of the hospital corpsmen on duty; the other locker room, with the same equipment, is for the street and ward uniforms of the female nurses. Each room is equipped with the usual foot-lever lavatory, as in each of the ward units. Gowns for the medical officers may be kept in one of the locker rooms. The only areas of infection in this building are the examining room, where the patients are first taken, and the locker room, where the doctors' and nurses' clothes are kept. Patients' clothes are sterilized before being put into the bag or storeroom. A lavatory operated by foot-levers and toilets, available for the doctors, is located at the end of the hall near the doctor's locker room.

The administration building is connected to the first ward by corridors, glazed on either side. Opening into this corridor are both steps and an incline. Similar corridors connect each ward, making a continuous passage from the administration building to the last ward of the group of buildings.

The ward is divided by a central corridor, on either side of which are located 12 separate units, or isolation rooms, large enough for two beds each if necessary, a room for the hospital apprentice in charge, a diet kitchen, minor surgical operating room, and a toilet.

At each end of the corridor is a small ward or solarium, having a capacity of six beds each, for convalescent patients. The other

buildings of the group are duplicates, except that the minor surgical room is a two-bed unit, only one surgical room being necessary for the ward group. The minor surgical room is available for all surgical treatment that may be indicated by complications in contagious diseases, and here also major operations may be performed. This room, 11 feet 4 inches by 12 feet, is equipped with a lavatory operated by foot-levers, instrument case, operating table, small sterilizer for instruments and basins, and a small instrument table. The windows, extending to the ceiling, are glazed with ground glass, affording the best of light. There is also a window of ground glass on the corridor side. The diet kitchen, 11 feet 4 inches by 12 feet, is equipped with a small refrigerator, dresser, sink, and tray sterilizer. The Hospital Corps room, for the apprentice on duty, is equipped with a desk, chair, a rack for chart boards, and a lavatory operated by foot-levers. At one corner of this room is a window on the corridor side, outside of which a mirror is placed to enable the apprentice in charge to look up and down the corridor to prevent those patients convalescing in the separate units from visiting each other. The toilet room in each ward is equipped with a shower bath and drying floor, toilets, slop sink operated by foot-levers, sterilizer for utensils, bedpan racks, and a foot-lever lavatory. A door leads out of this room to a roofed-over iron platform, where mops and brooms are kept, rubber sheets may be dried, etc. Each ward unit, 11 feet 4 inches by 12 feet, is equipped with two beds, two small metal bedside tables, lavatory with foot-lever control, soap and nail-brush container, glass shelf, toilet-paper rack, two hooks for gowns, towel rack, and metal basket for soiled towels. The beds have wheel casters, so that they can be easily rolled out to the solarium at the end of the ward. A window is located in the corridor wall to enable the nurse to look into each separate unit without entering. The lighting system for each unit is controlled from the corridor side instead of within the room, a switch being placed outside of each door. The solariums at each end of the ward are equipped with six beds, bedside tables, shelves, hooks, and a lavatory as in each unit. Convalescents here are controlled by the "barrier" system.

In the contagious hospital as planned above, modified from the isolation ward of the Providence City Hospital, patients with all forms of contagion can be properly isolated and the amount of mixed infection reduced to the minimum without having large separate wards for each separate type of case. This saves expense and reduces the size of personnel needed for the care of a large number of cases, and affords the best method for obtaining modern aseptic technique.

THE HOSPITAL CARE OF CONTAGIOUS DISEASES.

By LUCILE A. BUTLER and VIRGINIA RAU, Nurse Corps, United States Navy.

The study of contagious technique as carried on by some of our leading hospitals of to-day is very interesting and profitable.

After spending some time in one of these hospitals one comes to the conclusion that there is a way to care for people afflicted with a contagious disease without danger to the community or to the nurse; also that it is unnecessary to isolate those in attendance upon them as has been done heretofore.

It has been proved without a doubt by those who have made a careful study of contagious diseases that they are transmitted by contact and are not air-borne, as was formerly supposed. The contact may be direct or indirect—direct when there is actual contact with the patient and indirect when there is contact with a contaminated carrier. Anything that comes in contact with a patient, directly or indirectly, is contaminated and should be considered dangerous.

In order that time and labor may be saved when caring for these patients, it is necessary to divide them into units. A unit is an area which represents a separate and distinct infection. It may comprise a single bed or an entire room.

In caring for these different units it is necessary to use aseptic technique, the object being to confine the infection to one unit. In carrying out the medical asepsis one must remember that he is protecting himself from the patient, whereas in surgical technique the object is directly the opposite. The carrying out of the technique, however, is practically the same.

Each new admission is usually under observation for one week and is placarded "Detention," either bed or door detention, depending upon how many other units occupy the same room. Another placard, "Barrier," denotes that there is a question of diagnosis, or that other patients suffering from a different disease are being treated in the same ward. If after the detention period there is no question about their diagnosis patients may be transferred to a large convalescent room.

Corridors, kitchen, operating room and, as a rule, one utility room are kept free from contamination.

The nurses wear short-sleeved uniforms with the skirts about 5 inches from the floor. The school cap is also worn. Large gowns are worn by the doctors and nurses only when they come in intimate contact with the patients. The sleeves of the gowns extend down to the wrists where they are confined by elastic bands.

Before the nurses enter the wards they proceed to a dressing room, where each nurse has two lockers, one is marked "House uniform" and the other is marked "Ward uniform." The ward uniform is put

on and the nurse is ready to go to her ward. When going off duty the ward uniform is exchanged for the house uniform, first washing the hands before touching the house uniform.

The patients' rooms contain a bed, bedside table and chair, these constituting the actual areas infected. When the patient is discharged the bed, chair and table are washed with soap and water. The mattress is aired for 24 hours unless in case of death or a cross infection, when it is taken to the sterilizer. Soap and water, air and sunlight are the important germicidal agents in carrying out this theory. All rubber goods, toys, combs, shoes, slippers, etc., which would be destroyed by sterilization in an autoclave, are simply washed off with soap and water and aired for 24 hours. The patient's clothes worn on admission are sent to the laundry—that is, anything that is washable. Suits, furs, hats, and gloves are aired for 48 hours in the sunlight.

When ready to care for her patient the nurse puts on her gown, which hangs in the room, and proceeds to bathe the patient, make the bed, and take the temperature. When through with this she washes her hands and unties the strings on the neck of her gown, then those at the belt, bringing them forward and tying them so they will not drag on the floor. She then removes the gown and folding the inside in hangs it on the hook. Her hands having thus been contaminated again she gives them a thorough scrubbing. The scrubbing bowls are kept uninfected and are operated by the arm-lever or by the foot-pedals. The hands are held under running water and then soaped with a liquid from a container attached above the bowl, when they are scrubbed with a nailbrush. The palms are scrubbed, while the back of the hands and the arms are simply well washed, as the skin is too sensitive for the constant application of a brush. Individual towels about 15 inches square are used. In choosing the material for the towels it has been found that linen or huck which has been well laundered has been the least irritating to the skin and most satisfactory in regard to the wear of the laundry.

If the ward contains five or six patients of the same unit, i. e., all scarlet fever or diphtheria, it is not necessary to scrub between patients. Each room contains a small shelf large enough to hold a jar with 65 per cent alcohol for the thermometer and individual jars for cotton and ointment. In a ward with several units more shelves would be needed. Hooks for gowns are provided in the same manner. When planning the rooms it would be well to have the wash-bowl fixtures on the opposite side from the gown and shelf fixtures.

Soiled linen is thrown down a chute operated by a foot or arm control. This laundry is gathered up by a porter who wears a gown and washable gloves which are thrown in the laundry when he has finished.

The porter wears a gown and gloves when entering an infected building. The doors are usually opened and left open until he has completed whatever work he is about. If only one hand is used in carrying a pail or basket the glove on the noninfected hand could be slipped off and the door be opened with the clean hand. All door knobs on the outside of the doors are washed daily with soap and water. Any repairs made by workmen are made without wearing gowns, as they never handle the patients and always wash their hands on leaving the ward. Maids for the wards always wear gowns, removing them before leaving the wards and scrubbing their hands.

The food served in these wards is sent to each floor from a food carrier in the basement, which has been wheeled from the main kitchen, and is placed on a dumb-waiter. It is then taken off at each serving kitchen and served on the trays. When collecting these trays they are placed in a large steam dish sterilizer, one at a time. The dishes with the waste food are then taken out without touching the outside of the sterilizer and the food emptied into the waste can, which is next to the sterilizer. The dishes are then replaced in the sterilizer. The maid then turns on the water until all the dishes are completely covered. She then turns the steam on. The dishes are kept in until 15 minutes after the boiling point has been reached, when they are taken out and given the ordinary dish washing.

Bedpans and urinals are emptied into a hopper and washed with running water, after which they are placed in a utensil sterilizer, and when a sufficient number have accumulated they are covered with water and boiled for the same length of time as the dishes. This same technique applies to other basins and other utensils used in an infected area.

Before sweeping floors they are sprinkled with oiled sawdust, and the brooms used are scalded between each room. After all the rooms are swept one attendant gathers up the sweepings with a pan and brush, which are afterwards scalded and aired.

In case of death the same technique is carried out, the bodies being considered infectious. The nurse wears her gown when bathing the body and all orifices are packed with carbolized cotton. She then summons the porter, who takes the body to the morgue wrapped in a clean sheet.

All patients must stay in their own rooms unless they are allowed out of doors or have lavatory privileges. If children come out of their rooms or throw toys out of their own area they are kept in bed, or if necessary the door is closed. The toys given to very small children are usually tied in some manner to the bed.

Patients are permitted to write letters and collections are made triweekly, when they are sent to the dry sterilizer. Legal documents

may be signed without contamination if two clean towels are spread on the bedside table and the paper placed between them, leaving the space for signature uncovered. The nurse holds the towel and paper steady and the patient to whom an inked pen is given affixes his signature.

Special points to be remembered in the carrying out of this technique are: Never to touch the face while the hands are contaminated, not to lean against beds, chairs, or any furniture in the room unless a gown is worn. Remember to take into the room everything necessary to serve the patient before getting contaminated, to avoid either extra scrubbing of hands or the calling of a clean nurse away from her duties. Always scrub under running water.

This special technique would probably differ somewhat in different hospitals, but it should be remembered that the fundamental principle is the avoidance of contact, direct or indirect.

In summarizing this collected data it must be borne in mind that it is absolutely imperative to have the proper equipment at hand, i. e., plumbing, sterilizers, an abundance of linen, gowns and towels, particularly, before a practical demonstration can be carried out.

THE EXAMINATION OF AVIATORS.

By R. A. Bachman, Surgeon, United States Navy.

The examination of aviators presents many new points which differ from the usual physical examinations given to officers and enlisted men.

Flying is a new science and new faculties are brought into play, the soundness of which must be determined in the applicant. In addition to physical fitness, the emotional apparatus must be tested.

The Army Signal Corps has adopted a very complete procedure in examining its flyers and in this article liberal extracts will be made from the examination blank and its general form followed.

A new departure in physical examinations is the introduction of the Bárány tests for determining the condition of the vestibular function. Prof. Bárány originally devised these tests some years ago, but the modified technique employed at present and the application of the same to the examination of flyers is the work of Drs. Randall, Jones, Fisher, and Gile, of the University of Pennsylvania.

It will be noted, too, that the former physical examinations have been amplified and elaborated in many other respects.

In flying, the human body is pursuing such an unusual occupation in such an unusual environment that ordinary methods of examination must necessarily prove inadequate. It must be borne in mind, also, that flying being a new science, new experiences are bound to

accumulate, which will in all probability produce many future changes in the present proposed method of physical examination.

That the examination ought to be thorough and searching seems to be self-evident. It will be observed that a good many of the eye and ear tests are of German and Austrian origin. What these countries have done along this line since the war no one knows but it is sound military judgment to assume that their flying corps has been very carefully selected. We must meet this condition by an equal care in the selection of our men.

A tentative routine would be somewhat as follows:

GENERAL EXAMINATION.

1. Height, _____ inches. Weight, _____ pounds.
2. Chest, _____ expansion. _____ inspiration.

Follow Bureau of Navigation M. and S. Circular 125221, March, 1917: Instructions for Physical Qualifications Required for Appointment for Aeronautic Duty in the Navy or Marine Corps.

3. Lungs.
4. Bones and Joints.
5. Skin.
6. Nervous System:
   Reflexes of knee _____ elbow _____ ankle _____
   Vertigo.
7. Vascular System.
   (*a*) Pulse.
   (*b*) Arteries.
   (*c*) Blood pressure—systolic—diastolic.
   (*d*) Heart.
8. Digestive system:
   Vomiting.
9. Urinalysis:
   Shreds.
   Specific gravity.
   Reaction.
   Casts.
   Sugar.
   Albumen.
10. Wassermanns.
11. *Dynamic tests.*—(*a*) Walking: This test should be done by hav- g applicant, with closed eyes, walk forward, barefooted, 20 feet and ckward to point of starting. A straight line should be followed.
(*b*) Romberg: Maintain position for one minute without swaying.
12. *Eyes—History of eye trouble—Visible lesions.*—Question the ndidate carefully regarding previous or present eye trouble, use

of glasses, headaches, lacrymation, scotoma, and photophobia; also diplopia (muscae volitantes, panorama symptoms), glaucomatous symptoms, night blindness or asthenopia when not wearing correcting lenses. Any one of the latter group disqualifies and also of the former group, if marked. Note findings.

13. *Stereoscopic vision.*—Stereoscopic vision is the ability to appreciate depth and distances by means of binocular single vision. Objects printed on the test cards furnished for use with the stereoscope are drawn to scale, the distance between corresponding points of similar objects are equal; between dissimilar objects, unequal. They are seen at different apparent depths, the result of superposition of each two similar images in space; the less the distance between the objects, the nearer they appear to the observer's eyes; the greater the distance between, the farther away they appear. A normal eye can appreciate an apparent difference in distance between stereoscoped objects of 0.01 millimeter. Adjust the oculars of the stereoscope at their focal distance (15 centimeters) from the glass stage and rotate by means of the milled edge on either ocular cup so that the interpupillary distance will be as great or greater than the distance between any two similar points of objects to be stereoscoped. With good illumination, have the candidate name the sequence of objects from front to rear as he sees them through the stereoscope. This should be done readily and without error, otherwise it is a cause for rejection.

This test is best made by test card devised by Zeiss, of Jena. Bausch and Lomb probably have similar cards.

14. *Ocular movements.*—Ocular movements are tested roughly by requiring both eyes of the candidate to be fixed on the examiner's finger, which is carried from directly in front to the right, to the left, up and down. The movements of each eye must be regular and identical.

15. *Pupillary reactions.*—R_____ L_____

Pupillary reactions should be regular and equal in each eye when responding to (1) direct and (2) indirect light stimulation and (3) to accommodation. Face the candidate and place a card as a screen before both eyes. Uncover one eye after a short interval and allow light to shine in this eye. The resulting contraction of the iris of this eye is called direct. Repeat, but now observe the shaded eye. This reacton is indirect or consensual of the shaded eye. Repeat for the other eye.

With both the candidate's eyes open and uncovered, have him fix on a pencil held a few inches directly in front of him: bring the pencil toward him until it nearly touches his nose. Both irises will contract, which is called the reaction to accommodation.

16. *Intraocular tension.*—R_____ L_____

Intraocular tension is tested roughly by palpation. With the candidate looking down, palpate the eye through the upper lid with the index finger of each hand, and compare the tension with the other eye and with an eye believed to be normal. If not normal it is a cause for rejection.

17. *Nystagmus.*—Ocular nystagmus is determined, and if it is rythmical and occurs _____ (*a*) and (*b*) _____ on looking straight ahead or laterally, 40° or less, it is a cause for rejection.

Spontaneous ocular nystagmus produced by extreme lateral sight. 50° or more, is not a cause for rejection, as it is found in the normal individual. It is usually manifested by a few oscillating lateral movements, never rotary, which appear when the eyes are first fixed in extreme lateral positions. Select a scleral vessel near the corneal margin as a point for observation.

18. *Field of vision.*—R_____ L_____

Field of vision is tested separately for each eye. Place the candidate with his back to the source of light and have him fix the eye under examination (the other being covered) upon the examiner's, which is directly oposite at a distance of 2 feet. The examiner then moves his fingers in various directions in a plane midway between himself and the candidate, until the limits of indirect vision are reached. The examiner thus compares the candidate's field of vision with his own and can thus roughly estimate whether normal or not. A restricted field of vision should be confirmed by the use of a perimeter, as it would then be a cause for rejection.

19. *Color perception.*—This should be made with the Jennings test cards. In this test the yarns are fastened to a card—each shade beside a perforation. The candidate punches through the perforation and makes a record card. There is no guesswork, a permanent record is made and the scientific arrangement of the confusion colors insures proper application of the test.

20. *Muscle balance, at 20 feet.*

Hyperphoria.
Exophoria.
Esophoria.

If available, a phorometer should be used to determine the absence or presence of a muscular imbalance. Adjust the phorometer close to and in front of the candidate's eyes, 20 feet distant from a lighted candle or other small point of light on the same level. Darken the room and arrange the prisms so that their bases are situated inward; two images of the light will then be seen displaced laterally. If on a level, there is a normal balance of the vertically acting extrinsic eye muscles or orthophoria; if not on the same level, there is vertical imbalance or hyperphoria; left if the left image is

below, right hyperphoria if the right image is below. Read off on the scale the amount necessary to bring the images on the same level.

Repeat the test with the prisms, one up and one down. If the images are now directly above each other there is no lateral imbalance, but if laterally displaced and on the same side with the eye seeing each image, there is homonomous diplopia due to a lateral imbalance called esophoria. If the images are crossed there is exophoria. Read off on the scale the amount necessary (prism diopters) to bring them in the same vertical meridian. If not more than 1° of hyperphoria and more than 2° of esophoria or exophoria, the test is satisfactory.

21. *Visual acuity.*—(*a*) Snellen's type (20 feet).

Require 25/20 for each eye. There is no reason why the requirements for gun pointers should not be applied to aviators.

(*b*) Near point.—Right_____. Left_____.

Acuity for distance tested at 20 feet from a well-illuminated Snellen test card. Less than 25/20 in either eye, tested separately, disqualifies.

Near point, of acuity of vision, is determined separately for each eye by requiring the candidate to read in a good light the Jaeger No. 1 test type, first gradually bringing the card toward the uncovered eye until the nearest point to the eye, at which the test type still remains distinct, is reached. The distance of this point from the anterior surface of the cornea, measured in centimeters, is the near point. Greater than 11 centimeters at 20 years of age, greater than 13 centimeters at 25 years of age, or greater than 15 centimeters at 30 years of age, disqualifies.

22. *Ophthalmoscopic findings.*—Drop one drop of a 5 per cent solution of euphthalmine in each eye. Have the candidate keep his eyes closed. After 15 minutes repeat the drops; examine 15 minutes later. A pathological condition of the fundus, active or quiescent, is cause for rejection.

23. *Ears—History of ear trouble.*—(*a*) Discharge, _____. Buzzing, ringing, or noise, _____. Vertigo, _____. Seasickness, _____. Cranial injury, _____.

24. *Appearance of ex-auditory canal.*

25. *Appearance of membrani tympani.*

EAR DETERMINATION.

Hearing should be normal for each ear. To determine this both the whisper and watch tests are used. After examining both external auditory canals and membranæ tympani by means of a speculum and a good light (first removing wax if present) for abnormalities, such as small and tortuous opening, presence of pus, perforation, scars,

retraction, or other evidence of past or present inflammation, which are causes for rejection, the candidate is required to stand at 20 feet from the examiner, facing away from him. An assistant closes the ear not under examination with his moistened index finger pressed firmly into the external auditory meatus. The examiner facing the back of the candidate exhales, and then, with his residual air, whispers numbers, words, or sentences which the candidate should repeat. The other ear will then be tested in a similar manner. If unable to hear, the examiner will approach until the candidate does hear, the distance being recorded in feet. If less than 20 feet, it is a cause for rejection. A quiet room is essential.

The watch test is preferably made with a loud-ticking watch such as the ordinary Ingersoll, which, while variable, should be heard at about 40 inches. Any watch used should have been previously tried out on at least five normal persons and the distance heard made a matter of record. The number of inches in distance heard by the candidate, eyes closed and opposite ear occluded, is taken as the numerator and the distance the watch should be heard as the denominator. This should be the equivalent of 40/40; less hearing than this disqualifies.

26. *Examination of Eustachian tubes—per catheter.*

27. *Examination for diseased tonsils, adenoids, etc.*

EQUILIBRIUM (VESTIBULAR).

28. *Equilibrium* (vestibular). Head tilted forward 30° to level horizontal canal, using *Bárány* chair. Eyes closed. Rotation nystagmus normal, 26 seconds; a variation of 10 seconds under and 6 over is allowable.

(*a*) Right: Applicant to be turned toward his right, 10 turns in exactly 20 seconds; horizontal nystagmus to left for ——— seconds, amplitude.

Left: Applicant to be turned toward his left, 10 times in exactly 20 seconds; horizontal nystagmus to right for ——— seconds, amplitude.

Always test for spontaneous nystagmus before rotating.

(*b*) Pointing tests:

(1) Before turning.
Right arm, ———.
Left arm, ———.

(2) After turning 10 times in 10 seconds to right.
Right arm, ———.
Left arm, ———.

(3) After turning 10 times in 10 seconds to left.
Right arm, ———.
Left arm, ———.

(*c*) Falling tests:

(1) Turn to right, 5 turns in 10 seconds.
Falls to, ———.

(2) Turn to left, 5 turns in 10 seconds.
Falls to, ———.

If applicant is disqualified, use douche tests in every case.

The nystagmus, past-pointing and falling, are tested after turning. The turning-chair must have a headrest which will hold the head 30° forward, a foot rest and a stop-pedal. Use a stop watch.

(*a*) Nystagmus. Head 30° forward; turn candidate to the right, eyes closed, 10 times in exactly 20 seconds. The instant the chair is stopped, click the stop watch; candidate opens his eyes and looks straight ahead at some fixed distant point. There should occur a horizontal nystagmus to the left of 26 seconds' duration. Candidate then closes his eyes and is turned to the left; there should occur a horizontal nystagmus to the right of 26 seconds' duration.

(*b*) Pointing. (1) Candidate closes eyes, sitting in chair facing examiner, touches the examiner's finger held in front of him, raises his arm to perpendicular position, lowers the arm, and attempts to find the examiner's finger. First the right arm; then the left arm. The normal candidate is always able to find the finger. (2) The pointing test is again repeated after turning to the right, 10 turns in 10 seconds. During the last turn the stop pedal is released and as the chair comes into position it becomes locked. The right arm is tested, then the left, then the right, then to the left until he ceases to past-point. The normal will past-point to the right 3 times with each arm. (3) Repeat pointing test, after turning to the left.

(*c*) Falling. Candidate's head is inclined 90° forward, forehead to knees. Turn to the right, 5 turns in 10 seconds. On stopping, candidate raises his head and should fall to the right. This tests the vertical semicircular canals. Turn to the left, head forward 90°; on stopping, the candidate raises his head and should fall to the left. Unless each test is normal, it is a cause for rejection. Examination room should have apparatus for hot and cold douching of ear and for examination of drums.

In addition to the five senses ordinarily classified as special senses, the flyer uses his "muscle-joint-and-splanchnic" sense, and a seventh—the so-called "static sense."

Equilibrium is the result of a combination of the sight muscle and static senses. Of the three, the most directly concerned in balance is the latter, while the sight and muscle senses are only indirectly concerned.

This static sense has for its special organ the vestibular apparatus and the Bárány test as modified by the University of Pennsylvania

workers gives a clear-cut picture of the condition of this organ so important to the aviator.

For instance, in the matter of high flying or flying in the dark the static sense becomes at once practically the only means of maintaining the correct relation of his machine and of himself, to the earth.

Again in performing some difficult evolution or a series of hazardous turns, such as must surely fall within the experience of any flyer engaged in active duty, a perfect équilibration sense is necessary to gauge correctly the speed, direction and length of motion followed in performing the loop or turn.

It will be noted that the normal nystagmus is 26 seconds. A variation from this of 10 seconds down and 6 seconds up is permitted.

A particularly sensitive ear registering, for example, 34 seconds, might be too easily afflicted with vertigo and thus prove undesirable. Thirty-two seconds would at present appear to be a safe high limit. The effect, of course, of repeated flights is, that tendency to vertigo is reduced as the brain becomes accustomed to registering certain normal (to flying) disturbances or impressions in the canals.

The chairs used in the nystagmus and past-pointing tests are of a special design, so that they can be turned easily by means of a turning rod, fitted with a handle, projecting from the back. A pedal mechanism releases the chair for revolving and brings it to a sudden stop after the required number of revolutions. The chair must be stopped suddenly or the experiments will fail. The turns must be counted and timed accurately.

The eye and ear tests should be made only by a specialist in those branches. If the Bárány tests fail the candidate is always put through the ear douching test before final rejection. In this test the eardrum is first inspected for perforations or other pathological conditions, and when found intact, a nozzle is inserted into the canal and water at a temperature of 68° F. is permitted to flow against the drum. With the head bent at an angle of 30° forward, the endolymph of the vertical canal is put in motion through cooling of the lower parts, on the thermosyphon principle, and causing a vertical nystagmus, a flow is produced. By turning the head backward or letting it fall forward, the horizontal canals are similarly affected. Nystagmus begins in about 20 seconds. If after four minutes of douching no results are produced the flow of water is stopped.

PSYCHOLOGICAL TESTS.

The psychological tests are made either by a Hipp chronoscope or a d'Arsonval chronometer.

The Hipp chronoscope is practically the same as the d'Arsonval chronometer and can be used for exactly the same purpose. The chief difference is that the clockwork of the Hipp instrument is actuated by a weight and that of the d'Arsonval by a spring mechanism. The Hipp is more accurate, giving its readings in the 1/1000 of a second, the d'Arsonval in the 1/200.

The manner of taking the reaction is the same in both—a visual, auditory, or tactile signal is given depending upon the psychological reaction desired, which automatically breaks the current; the needle revolves, the subject presses a key, the current is connected again, and the needle stops. The reading is taken from a dial. The dial of each is scaled in 100 divisions, but in the Hipp the needle revolves around the full dial in 1/10 second, while in the d'Arsonval it makes the circuit in 1 second. In the Hipp the nature of the signal is left to the choice and requirements of the operator.

There is a Hipp chronoscope in use at the psychological laboratory of the University of Pennsylvania.

The value of these psychological reactions is still debatable.

It seems to be desirable that some form of tests be made to determine judgment and emotional control in the applicant. As for the latter, it would appear to be reasonable that this testing could best be made during the stage of apprenticeship which the flyer undergoes. The various emotional disturbances which the beginner experiences react on him considerably and the teacher usually becomes quickly cognizant of them. Those who show inaptitude in this respect could be weeded out at the aviation camps. A medical officer's supervision is always at hand at every flying camp, and he could be utilized to assist the instructor in making observations. At present, the method employed of producing a sudden shock, such as shooting a pistol or creating some other loud noise suddenly behind the unexpecting candidate does not meet the requirements.

To establish the presence of normal judgment in a candidate is not easy, yet very necessary. Judgment of distance, time and speed enter considerably into flying in all its phases. A crude attempt to obtain some means of measuring this mental attribute was made recently at the Naval Hospital, Philadelphia, Pa.

Two sticks, twenty-seven inches and twenty inches long, respectively, were hung on a wall; a board with three revolving 9-inch disks, each disk revolving at a slightly different rate of speed, was made; and an 8-inch wooden square was sawed in seven pieces. A sand watch was also used.

To determine distance judgment, the candidate was required to estimate the length of the two sticks, after having been shown a yardstick. To determine time judgment, he was required to estimate the length of time it took for a certain amount of sand to run back after

he had been permitted to see it flow into the empty compartment. The operator tried to approximate a half minute in the filling.

"Arrangement judgment" was gauged by the length of time required to arrange the sawed pieces of wood into a perfect square. Speed judgment was measured by the candidate's ability to range the disks in the order of their speed. The diameter of the blocks, attached to the disks, which carried a string belt imparting motion to them, was 5½, 6, and 6½ inches. Thus they moved almost at the same rate of speed.

A hundred men were examined and the results tabulated. The 30 best results and the 30 poorest are appended. All of the latter missed at least two tests by a big margin. Of the 30 best ones, none took more than 30 seconds on the blocks, excepting No. 11, a man 47 years of age. All of them ranged the disks correctly. The watch test exceeded 10 seconds in only five instances. The average error in guessing the length of the two sticks exceeded 10 inches only once. In the 30 poorest it was exceeded nine times. These figures warrant, I think, the conclusion that tests of judgment are possible, especially if better mechanical appliances are used instead of the crude, makeshift objects hurriedly devised for making the above tests.

The points I wish to emphasize in conclusion are that an eye and ear specialist should conduct the examinations of these organs, that the Bárány test should be accurately made with a well-constructed chair by an ear specialist, that abnormal emotional disturbances should be noted by observation during the apprentice period, that judgment tests can be applied but are difficult of standardization, and finally that a standard examination chart should be furnished to make the examination of aviators complete, thorough, and uniform.

THE THIRTY POOREST.

Name.	Rate.	Occupation.	Age.	Blocks (minutes).	Sticks (inches).	Disks.	Watch (minutes).	Remarks.
1 H., E. J....	HA.....	Conductor, high school.	19	7	34 24	1/3	3	
2. O., J. S	HA-1.....	3 years drug clerk, ninth grade P.	23	35	24 18	1/3	2½	Dull; slow of comprehension.
3. S., W. D ...	Ch. Y.....	Stenographer B. C., grammar school.	20	112	40 30	1/3	5	
4. F., E. H ...	Ch. Y.....	Stenographer, high school.	20	185	25 18	3/3	15	
5. N., J. F....	Sea.....	Iron worker.....	24	21	30 22	1/3	32	Very poor idea of time space.
6. W., S	HA.....	1 year college, assayer.	24	34	24 16	0/3	0	
7. R., E	Pvt. M. C.	Laborer.....	22	487	25 21	0/3	13	Very sluggish mentally; seems to comprehend, but to be unable to carry out his thought.
8. E., R	HA.....	Printer.....	20	23	36 24	0/3	6	

Name.	Rate.	Occupation.	Age.	Blocks (minutes).	Sticks (inches).	Disks.	Watch (minutes).	Remarks.
9. N., J. N....	F-2.....	Laborer.....	23	425	15 13	0/3	58	Patient seems to be a high-grade imbecile; very inattentive.
10. P., W. W ..	HA.....	High school.....	19	23	24 18	0/3	10	
11. R., W	MsA-2....	Packer (negro)	18	195	25 16	1/3	14	Nervous and inattentive.
12. G., T. E ...	HA.....	Molder.....	19	82	30 24	0/3	4	Nervous and a little dull of comprehension.
13. J., A. W ...	Ph.M-2...	Druggist.....	26	82	27 19	0/3	15	
14. B., J. D....	HA-1.....	Clerk.....	19	29	24 12	1/3	36	
15. G., H	HA-1.....	1 year college.....	24	83	28 16	1/3	12	
16. R., E	Sea.....	Mechanic.....	21	19	28 19	1/3	5	
17. N., K.....	HA-1.....	Lineman.....	23	19	30 20	1/3	2	
18. W., H. E ..	HA-1.....	Clerk.....	18	38	24 18	0/3	7	
19. C., D. H ...	Ph. M-2...	4 years high school.	22	82	26 19	1/3	10	
20. K., J. J	Ch. Y.....	Real estate, high school.	25	60	26 24	0/3	5	
21. H., F. C	Asst. surg.	M. D., assistant surgeon.	22	29	26 22	1/3	3	Slow.
22. H., J. J	...do.....	Student, M. D....	24	46	24 18	0/3	5	Slow; slow to comprehend.
23. C., C	...do.....	.....do.....	30	88	30 18	3/3	0	Failed to comprehend block test.
24. M., W. T...	Sea.-2.....	Clerk.....	25	62	24 15	3/3	6	
25. M., W. B ...	W. T.....	Locomotive engineer.	32	122	24 18	1/3	15	Lost position because of accident.
26. A., H. A ...	M-1.....	Clerk.....	24	242	18 12	3/3	20	Very dull of comprehension; mentally slow; apparently nervous.
27. T., J. C	HA-1.....	Salesman, 4 years high school.	20	152	24 18	3/3	8	
28. H., B. F ...	El-2.....	Moving-picture operator, 1 year high school.	25	370	30 24	0/3	5	
29. U., L	Ph. M-2...	Clerk.....	23	186	36 24	1/3	3	Filipino.
30. T., T. V	HA-1.....	.....do.....	21	30	26 18	0/3	3	Not athletic.

THE THIRTY BEST.

1. T., M. H ...	HA-1.....	..Student, 2 years college.	23	10	30 18	3/3	15	Quick of comprehension; speedy in replies; football; runner.
2. S., C. L.....	HA-1.....	Student, 3 years college.	22	10	28 14	3/3	2	Fairly quick at comprehension; football; runner.
3. H., A. W ..	HA-2.....	Student, 1 year college.	20	11	20 14	3/3	1	Fairly quick at comprehension; some athletics.
4. P., W. D....	HA-1.....	Printer.....	20	14	32 20	3/3	2	Mentally alert; basket ball.
5. O., W	HA-1.....	Salesman, 1 year high school.	22	9	27 18	3/3	6	Track athlete; football; swimmer.
6. L., W. F ...	HA-2.....	Printer, 1 year high school.	18	10	24 18	3/3	3	Quick at comprehension; basket ball; swimmer.
7. K., W. D ..	Pvt., 1st Pa.	Machinist.....	28	11	27 20	3/3	7	
8. W., S. W ..	Lieut.....	Engineer.....	33	28	26 16	3/3	6	
9. S., R. S	Bugler....	Vocalist.....	29	21	32 21	3/3	4	
10. E., G. D ...	Sea-2.....	Machinist, student.	19	11	27 18	3/3	3	
11. A., A. M ...	1st serg...	Clerk.....	47	11	30 24	3/3	5	
12. R., F. H ...	CMM.....	Machinist.....	31	15	31 25	3/3	4	

Name.	Rate.	Occupation.	Age.	Blocks (minutes).	Sticks (inches).	Disks.	Watch (minutes).	Remarks.
13. W., G.....	Sea-1.....	Machine helper....	19	25	27 16	3/3	3	
14. L., W.....	Sea-2.....	Plasterer.....	19	15	27 17	3/3	4	
15. S., A. A	Asst. surg.	Clerk, student.....	26	22	26 18	3/3	1	
16. L., E. F	...do.....	Teacher, student..	30	14	24 18	3/3	13	Good judgment and poise.
17. E., C. J	...do.....	Student.....	28	11	26 18	3/3	4	
18. N., C. S	...do.....	.....do.....	27	12	28 22	3/3	8	Baseball.
19. R., H.....	...do.....	.....do.....	25	8	26 18	3/3	6	
20. G., E.....	HA-1.....	2 years college, pharmacy.	22	10	30 24	3/3	12	Track; alert.
21. B., F. F	HA-1.....	Clerk.....	22	23	29 17	3/3	8	
22. T., H.....	HA-1.....	4 years high school	18	12	28 18	3/3	4	Alert; some athletic work.
23. D., J. M	HA.....	Clerk, 2 years high school.	24	6	28 20	3 3	20	
24. T., O. G....	HA-1.....	4 years high school.	18	16	28 18	3/3	10	Basket ball.
25. W., E. W ..	HA-1.....	4 years high school, clerk.	19	9	22 18	3/3	3	
26. V., M. L ...	Pvt. M. C.	Collector.....	20	13	24 16	3/3	2	Athlete; high jumper.
27. V., N.....	HA-1.....	2 years high school.	18	9	28 18	3/3	1	Y. M. C. A. track team; basket ball.
28. H., J. O	Y-3.....	4 years high school, clerk.	21	8	28 18	3/3	15	All around athlete.
29. L., R. H ...	Asst. surg.	Hard work, student.	25	14	24 15	3/3	5	Not athletic.
30. K., P.....	...do.....	Student.....	25	8	28 18	3/3	3	Athlete.

PREPARATION OF DAKIN SOLUTION.

By R. R. Noyes, Assistant Surgeon, United States Navy.

If we are to judge by the discussions heard in connection with the preparation of this solution, considerable difficulty is experienced in obtaining a satisfactory product. As the object sought is the preparation of a solution containing between 0.45 and 0.5 per cent of sodium hypochlorite and one that will not be alkaline to phenolphthalein, this should not be and most certainly is not difficult of attainment. Many schemes and methods have been advanced for its preparation. From some personal experience and from testimony of others there seems to be no doubt that that method in which is used the chlorinated lime, dry sodium carbonate, and sodium bicarbonate, as purchased in the open market, is the easiest and only safe method for the preparation of the desired solution. This method is nothing more than a slight modification of the Pharmacopœial method for the preparation of "liquor sodae chlorinatae," which is sufficient assurance for its efficiency. It is felt that if the following directions, even though *apparently* involved and awkward, be closely followed

success is assured, such assurance being based upon actual trial by those but little accustomed to laboratory methods and procedures.

As a sample of chlorinated lime containing not less than 25 per cent of available chlorine is the prime requisite and as samples of this substance are so variable in the available chlorine content, an assay is the first step in the process. This is carried out as follows: Obtain a representative sample by taking a portion from different parts of the container, mix thoroughly in a mortar, quickly weigh out 10 grams, place in a bottle and pour upon it 500 c. c. of water, stopper the bottle and allow to stand, with occasional shaking, for one hour. Filter a portion of this solution through a dry filter and into a dry flask until from 75 to 100 c. c. of filtrate are obtained. Call this filtrate A. Stopper the flask and keep it so. Now into a 100 c. c. volumetric flask measure exactly 10 c. c. of the filtrate, add 20 c. c. of a 10 per cent solution of potassium iodide, then 2 c. c. of glacial acetic acid, mix, and allow to stand for a few minutes, then add water to make 100 c. c. of solution and then thoroughly mix. Call this solution B. Fill a burette with this solution. In a beaker of about 75 c. c. capacity place exactly 5 c. c. of N/10 sodium thiosulphate, add about 2 c. c. of starch paste, and from the burette add solution B until a faint blue color is produced. Each c. c. of N/10 thiosulphate equal 0.003723 gram sodium hypochlorite and 5 c. c. will equal 0.018615 gram. Let it be supposed that it was necessary to add 28 c. c. of solution B from the burette to bring about the end reaction. Then the 28 c. c. contained the equivalent of 0.018615 gram of sodium hypochlorite. The 100 c. c. of B will contain X grams. Stated in the form of a proportion this becomes:

$$0.018615 : 28 : : X : 100$$

$$28X = 1.8615$$

$$X = \frac{1.8615}{28} = 0.0665$$

The 100 c. c. of solution B contain the equivalent of 0.0665 gram sodium hypochlorite. But this solution was made from 10 c. c. of solution A, so 10 c. c. of solution A contain that same amount. Ten c. c. of solution A contain 0.2 gram of the sample. Then, if 0.2 gram of the sample contains the equivalent of 0.0665 gram of sodium hypochlorite 100 grams of the sample will contain X grams, or—

$$0.2 : 0.0665 : : 100 : X$$

$$0.2X = 6.65$$

$$X = \frac{6.65}{0.2} = 33.25$$

The sample of chlorinated lime contains the equivalent of 33.25 per cent of sodium hypochlorite.

Having obtained a sample that assays above 25 per cent, the solution proper is prepared as follows: In a jar, bottle, or other vessel

of 12 to 15 liters capacity place 200 grams of the chlorinated lime and pour on it 5 liters of water. Allow to stand in a cool place for two or three hours with occasional stirring. In another 5 liters of water dissolve 80 grams of dry sodium carbonate and 100 grams of sodium bicarbonate. Add this solution to that of the chlorinated lime. A gelatinous precipitate which does not readily settle will form. This must be converted into a granular condition by vigorous stirring or shaking. The container holding it must be closed in some manner, placed in a cool place, and allowed to settle. The clear supernatant fluid is then syphoned off into a large bottle. It is well to measure the solution as it is drawn off, for its volume must be known. Call this solution C.

The strength of the solution must now be determined. To do this proceed as follows: Place exactly 10 c. c. of this solution in a 100 c. c. volumetric flask, add 20 c. c. of a 10 per cent solution of potassium iodide, then 2 c. c. glacial acetic acid and allow to stand for a few minutes. Now add water enough to make 100 c. c. and mix. Call this solution D. Place in burette and titrate against 5 c. c. of sodium thiosulphate, just as was done with solution B in the assay of the sample. Let us suppose that it required 29 c. c. to bring about the end reaction. Five c. c. of the thiosulphate=0.018615 sodium hypochlorite. Then 29 c. c. of D contain this quantity of the hypochlorite. If 29 c. c. contain 0.018615 gram the 100 c. c. will contain X grams, or—

$$29 : 0.018615 : : 100 : X$$
$$29X = 1.8615$$
$$X = \frac{1.8615}{29} = 0.0642$$

One hundred c. c. of D contain 0.0642 gram of sodium hypochlorite. But this 100 c. c. of solution was made from 10 c. c. of solution C. Ten c. c. of solution C then contain 0.0642 gram of the hypochlorite. One hundred c. c. of C contain $0.0642 \times 10 = 0.642$ gram. This is too strong, hence dilution is necessary. As only 0.5 gram per 100 c. c. is desired we find by the proportion—

$$100 : 0.642 : : X : 0.5$$
$$0.642X = 50$$
$$X = \frac{50}{0.642} = 77.88$$

that is, each 77.88 c. c. should be diluted to 100 c. c. with water, or to 7.788 liters 2.212 liters of water. Having made the necessary dilution it must again be standardized in order to avoid mistakes. If found to be of correct strength it is placed in well-stoppered bottles and stored in a cool, dark place.

It must be borne in mind that in this work solutions with which we deal are readily decomposed and should be kept in stoppered containers at all times.

The starch paste used as indicator is made by mixing one gram of starch with about 10 c. c. of water and pouring it into 200 c. c. of boiling water.

The N/10 sodium thiosulphate is made by dissolving 24.8 grams of the substance in sufficient water to make 1,000 c. c. of solution. This substance is also called sodium hyposulphite and has the formula $Na_2S_2O_3.5H_2O$. The reason for using 24.8 grams per liter for an N/10 solution is indicated in the following reaction:

$$2Na_2S_2O_3.5H_2O+2I=Na_2S_4O_6+2NaI+10H_2O.$$

It is observed that two atoms of iodine react with two molecules of the thiosulphate. If that be the case then one atom of iodine will react with one molecule of the thiosulphate. As one gram atom of iodine is used to make a liter of N/1 solution, then the gram molecule of the thiosulphate must be used to make a liter of N/1 solution. For an N/10 solution we would, of course, use 1/10 gram molecular weight.

In the assay use is made of the following reactions. Acetic acid liberates hypochlorous acid (HClO) from the chlorinated lime as:

$$2CaCl(ClO)-2HC_2H_3O_2=CaCl_2-Ca(C_2H_3O_2)_2-2HClO.$$

The acetic acid also liberates hydriodic acid from potassium iodide as:

$$KI-HC_2H_3O_2=HI-K(C_2H_3O_2).$$

The hypochlorous acid reacts with the hydriodic to liberate iodine from the latter:

$$2HI-HClO=I_2-HCl-H_2O.$$

The liberated iodine is then titrated against the thiosulphate, the reaction taking place being:

$$2Na_2S_2O_3.5H_2O+I_2=2NaI+Na_2S_4O_6+10H_2O.$$

In the preparation of the solution the sodium carbonate converts the chorinated line into calcium corbonate and sodium hypochlorite and sodium chloride as:

$$CaCl(ClO)+Na_2CO_3=NaClO+NaCl+CaCO_3.$$

In the assay of this solution the acetic acid liberates hypochlorous acid from the sodium hypochlorite and also liberates hydriodic acid from potassium iodide as:

$$NaClO+HC_2H_3O_2=HClO+Na(C_2H_3O_2)$$
$$2KI+2HC_2H_3O_2=2HI+2K(C_2H_3O_2).$$

The hypochlorous and hydriodic acid react as follows:

$$2HI+HClO=I_2+HCl+H_2O.$$

The iodine and sodium thiosulphate react as:

$$2Na_2S_2O_3.5H_2O+I_2=2NaI+Na_2S_4O_6+10H_2O.$$

When the four reactions just given are examined, we find that one sodium hypochlorite gives one molecule of hypochlorous acid and that one molecule of hypochlorous acid liberates two atoms of iodine and two atoms of iodine react with two molecules sodium thiosulphate. Put in a graphic form this statement becomes:

$$NaClO=HClO=I_2=2Na_2S_2O_3.5H_2O$$

or

$$NaClO=2Na_2S_2O_3.5H_2O$$

or

$$\frac{NaClO}{2}=Na_2S_2O_3.5H_2O.$$

As the molecular weight of the thiosulphate is used to make a liter of N/1 solution, such solution would be equal to or represent one-half the molecular weight of sodium hypochlorite. The molecular weight of the latter is 74.46, and one-half of this is 37.23. One c. c. of the N/1=0.03723, and one c. c. of N/10=0.003723.

There is no good reason why the preparation of this solution should require more than three hours. Trial has proved this to be easily possible.

THE PREPARATION OF DAKIN'S SOLUTION AND THE CARREL TECHNIQUE IN THE TREATMENT OF INFECTED WOUNDS.

By W. N. McDonell, Surgeon, United States Navy.

Ever since the publication of the wonderful results obtained by Dr. Alexis Carrel in the treatment of infected wounds at his hospital at Compiègne, surgeons in this country and abroad have attempted to obtain similar results by following his methods. Their efforts have met with varying degrees of success, depending on how closely they followed the Carrel technique.

Carrel's object in the treatment of infected wounds in the main is to obtain prompt sterilization of the wound and early subsequent closure. After experimenting with numerous disinfectants in conjunction with Dakin, he finally decided in favor of a sodium hypochlorite (NaOCl), which contains not less than 0.45 per cent nor more than 0.50 per cent sodium hypochlorite, and which is not alkaline to solid phenolphthalein. If the percentage of sodium hypochlorite is less than 0.45 per cent, the antiseptic power of the solution is too low; if greater than 0.50 per cent, the solution is irritating. If the solution is alkaline to phenolphthalein, it is irritating.

This is known as Dakin's solution. Many of the failures to obtain results with Dakin's solution are due to the fact that it is not properly prepared.

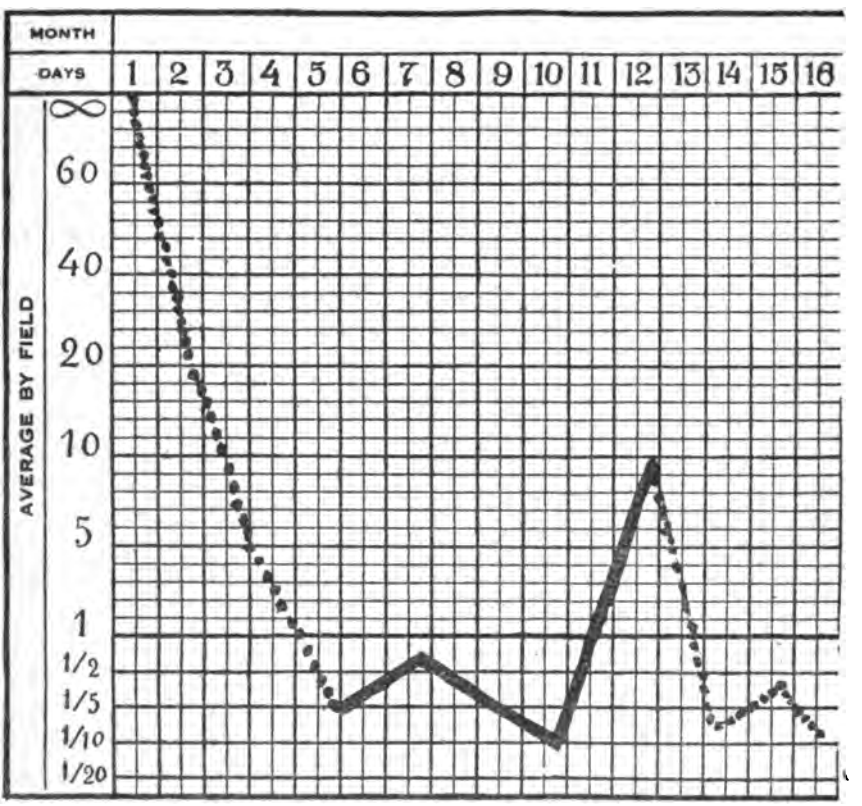
Dakin's solution may be satisfactorily prepared in several ways:

First.—By the electrolysis of a sodium chloride solution. This method gives a more satisfactory product, but requires apparatus and electric current that are not always available.

BACTERIOLOGICAL CHART

Name: ..... *Ward:* .....

Nature of the wound Leg ulcer



Dotted line: Dakin's solution. Solid line: Chloramine paste.

Second.—By the action of chlorine on sodium carbonate. This, the most direct method, has hitherto been practically unavailable, because of the difficulty of measuring liquid chlorine. This disadvantage

has, however, been recently overcome. The amount of chlorine used can be accurately measured with a chlorine measuring apparatus such as is used in measuring chlorine in the purification of water. (This apparatus is manufactured by Wallace & Teirnan, of New York City.) Liquid chlorine in 15–30 pound lots can be carried in containers weighing about 60 pounds, which would make it readily transportable on the field. Owing to the marked difference in the chlorine content of the different bleaching powders, two containers rarely titrating the same, this method would seem to be preferable for use in the field and aboard ship.

Third.—By the double decomposition of calcium hypochlorite and sodium carbonate. This method, the one first used by Dakin, has been, because of the ease of obtaining the necessary chemicals, the most available one. The alkalinity of the solution, after the precipitation of the calcium carbonate, may be neutralized either by the addition of boric acid or by the use of a mixture of sodium carbonate and sodium bicarbonate in the precipitation. In either case it is necessary to determine the percentage of available chlorine in the bleaching powder with which one is working.

Titration of bleaching powder.

Exactly 20 grams of bleaching powder, made up of small samples from different parts of the jar in order to obtain a uniform sample, are well stirred up in a liter of water. After standing a few hours (at least six hours) the supernatant liquid is decanted through a filter paper and a 10 c. c. sample of the filtrate is titrated in exactly the same manner as in the titration of Dakin's solution. In this case the number of cubic centimeters of decinormal hyposulphite required to decolorize is multiplied by the factor 1.773 to give the percentage of active chlorine.

The following table, by Daufresne, gives directly, according to the amount of active chlorine contained in the bleaching powder, the quantity of bleaching powder, sodium carbonate (dry), and sodium bicarbonate to prepare 10 liters of Dakin's solution:

Percentage in active chlorine, of the chloride of lime.	Quantities of ingredients to use for preparing 10 liters of Dakin's solution at 0.475 per cent of (ClONa).			Percentage in active chlorine, of the chloride of lime.	Quantities of ingredients to use for preparing 10 liters of Dakin's solution at 0.475 per cent of (ClONa).		
	Chloride of lime.	Dry sodium carbonate.	Sodium bicarbonate.		Chloride of lime.	Dry sodium carbonate.	Sodium bicarbonate.
	Grams.	*Grams.*	*Grams.*		*Grams.*	*Grams.*	*Grams.*
20	230	115	96	29	159	80	66
21	220	110	92	30	154	77	64
22	210	105	88	31	148	74	62
23	200	100	84	32	144	72	60
24	192	96	80	33	140	70	59
25	184	92	76	34	136	68	57
26	177	89	72	35	132	66	55
27	170	85	70	36	128	64	53
28	164	82	68	37	124	62	52

Example.

If 10 c. c. of the filtrate require 16.6 c. c. of decinormal hyposulphite the percentage of active chlorine is:

16.6×1.773=29.4 per cent.

That is, we require to prepare 10 liters of the solution—

159 grams bleaching powder.

80 grams carbonate of sodium.

66 grams bicarbonate of sodium.

If dry sodium carbonate is unavailable one should use 2.85 times as much of the sodium carbonate crystals; that is, 228 grams sodium carbonate (crystals).

The titration of Dakin's solution.

The percentage of sodium hypochlorite is determined by titrating with tenth normal sodium hyposulphite (thiosulphate) the amount of iodine liberated by a measured amount of Dakin's solution. The technique is as follows:

Measure 10 c. c. of Dakin's solution, using a bulb pipette, into a beaker or Erlenmeyer flask containing about 50 to 75 c. c. of water.

NOTE.—The disappearance of color is most easily observed when the volume of fluid in the vessel is between 50 and 100 c. c.

Add 10 c. c. of a 10 per cent potassium iodide solution and 2 c. c. of glacial acetic acid. Then run decinormal hyposulphite solution into the flask from a burette until the discoloration of the solution is complete.

The number of cubic centimeters of decinormal hyposulphite required to decolorize the solution multiplied by the factor 0.03723 gives the percentage of sodium hypochlorite. For example:

12.10 c. c.×0.03723=0.45 per cent.

13.43 c. c.×0.03723=0.50 per cent.

Test for alkalinity.

A few crystals of powdered phenolphthalein are dropped on the surface of 10 to 20 c. c. of the solution to be tested. Dakin's solution should remain entirely colorless. If there is any red discoloration the solution is too alkaline and must either be discarded or neutralized.

NOTE.—It is important to remember that the tests of Dakin's solution for alkalinity and for strength of sodium hypochlorite are entirely independent, but equally important.

Details for preparation.

Place in a 20-liter flask or bottle the amount of bleaching powder indicated by the titration and mix well with 5 liters of tap water. Shake vigorously and allow to stand for several hours (overnight).

Dissolve the designated amounts of sodium carbonate and sodium bicarbonate in another 5 liters of tap water in the morning or after 6 to 12 hours; pour the solution of sodium carbonates into the bottle

containing the bleaching powder; shake well, and allow the precipitated calcium carbonate to settle. After half an hour siphon off the clear liquid through a double filter paper. The product should be perfectly clear and should be titrated for strength of hypochlorite and tested for alkalinity.

Preservation.

Since light greatly accelerates the rate of decomposition of the hypochlorite solution, it is best to keep Dakin's solution either in dark bottles or in a dark cupboard or an ice box. Daufresne has found that the addition of 5 milligrams of potassium permanganate per liter of solution exerts a markedly stabilizing effect. It is convenient to make a half per cent (5 grams per liter) solution of potassium permanganate and add 1. c. c. of this solution per liter of Dakin's solution. The color imparted by the permanganate does not interfere with the titration.

Preparation of N/10 sodium thiosulphate.

This solution must be carefully prepared, for upon its accuracy depends the accuracy of the titration of sodium hypochlorite. The sodium thiosulphate may be obtained in a pure form from any of the large chemical houses.

24.82 grams made up to 1 liter in a volumetric flask gives a tenth normal solution, 1 c. c. of which is equivalent to 0.003723 grams of sodium hypochlorite.

If it is anticipated that an accurate analytical balance will not be available, it is possible for one to carry either a small amount of standard solution or carefully weighed sample of thiosulphate, which may be diluted to the required volume as required. This would then serve as a standard.

For example.—A 24.82-gram portion, accurately weighed, is carried in a well-stoppered bottle and when required is carefully dissolved and made up to 1 liter in a 1,000 c. c. volumetric flask. A sample of Dakin's solution titrated with this standard N/10 solution in three titrations requires, let us suppose, 12.6, 12.7, and 12.65 c. c., i. e., an average of 12.65 c. c. The strength of sodium hypochlorite in the Dakin's solution is therefore—

$$12.65 \times 0.03723 = 0.471.$$

Titration of chloramine (*chlorazene*).

Titrate 10 c. c. in exactly the same manner as in the titration of akin's solution. Multiply the number of c. c. decinormal thiosulate solution required to decolorize by 0.141 to give the percentage f chloramine.

Having prepared a satisfactory solution of sodium hypochlorite e next thing to consider is the preparation of the apparatus for tillation.

A. *Making of the instillation tubes.*

1. Take small rubber tubing of interior diameter of 4 millimeters; cut it into segments 30 and 40 centimeters long; ligate the tubes at one end with cotton thread.

2. Pierce the tubes with small holes with a special punching apparatus at intervals of from 5 to 20 centimeters from the closed extremity. The tubes 30 centimeters long are pierced over a length of 5 and 10 centimeters, and the tubes 40 centimeters long over a length of 15 and 20 centimeters.

3. Making of tubes with turkish toweling at perforated ends.

4. Making of a tube with a single opening.

B. *Distributing tubes.*

1. See that the four types of distributing tubes with one, two, three, and four branches are of the proper caliber. The inside caliber of the larger end of the tube should be about 7 millimeters, while the inside caliber of the branches should be 4 millimeters.

2. Glass connecting tubes.—Cylindrical tubes of 7 millimeters inside diameter and cylindrical tubes of 4 millimeters inside diameter.

C. *Irrigating apparatus.*

A flask holding a liter. The lower orifice of it should be about 7 millimeters in diameter. The irrigating tube, of red rubber, should be of the same caliber. The flow in the tube is controlled by a pinch cock. Testing the pinch cock to ascertain that the spring is strong enough to intercept the fluid.

Arrangement of the tubes in the wound.

1. According to the shape of the wound.—Surface wounds, " Seton " wounds, wounds with several openings.

2. According to the state of infection.—Use of the single opening tubes and the different kinds of perforated tubes depends on the condition of the wounds. Fresh wounds and suppurating wounds are treated differently.

Dressings.

1. Making of sheets for dressing.—The sheets are prepared in four different sizes. They are made of a layer of gauze, a sheet of absorbent cotton wool, a sheet of nonabsorbent cotton wool, and a sheet of gauze.

2. Preparation of vaseline compresses.

Methods of carrying out the dressing.

Every patient must be dressed in his bed. There must be no suffering during the dressing. When a patient cries during the dressing, it demonstrates that the technique of the surgeon is bad.

1. Wash the surface of the wound and surrounding skin with neutral oleate of soda, on a sponge of absorbent cotton without gauze. Then wash it with sterile water. Dry the surface of the skin with gauze compress, and protect it with pieces of gauze sterilized in yel-

low vaseline. The lower part of the limb should be protected, and not the part which is above the wound.

2. Put the dressing sheets under the limb, ready to be folded. Then select perforated tubes of the proper size and place them in such a way as takes into consideration gravity in order that every part of the wound be irrigated.

3. Fix the tubes with gauze, loosely packed.

4. Before closing the dressing test the working of the tubes by using a syringe. Then close the dressing sheets and fix with safety pins without using bandage.

Principles of the technique of the chemical sterilization of wounds.

1. Wounds received in warfare are grossly infected.

2. Conservation is only possible in war surgery in conjunction with a method effecting sterilization of these badly infected wounds.

3. Operation is only a preliminary step to the first dressing. Operation must be controlled by following the clinical and bacteriological examination of the wound.

Technique of the sterilization of wounds.

Two steps.—The first step of the disinfection is to obtain thorough opening of the wound and to remove contused and necrotic tissue. The second step is the chemical sterilization.

Bacteriological examination of wounds.

1. Instillation should be interrupted two hours at least before the secretion is examined.

2. Take a rigid platinum wire mounted on the end of a glass rod. Scrape lightly the surface of the wound in selecting the deep parts and the necrotic structures. Spread the secretion on a slide labeled with the name of the patient, his number, and the region of the wound whence the secretion is taken. Arrange the slides prepared during the round in a box for microscopic specimens.

3. Fix the smear in a Bunsen burner; place it on a glass support and stain it with a few drops of carbolized thionin; wash it with water, and put aside to dry.

4. Counting the bacteria.—Examine the preparations with a No. 12 immersion objective and a No. 3 eyepiece. Count the number of bacteria in 5 or 10 fields of the bacteria, and take an average. Record the number of bacteria on the bacteriological chart.

5. Causes of error.—Hemorrhage, necrotic tissue, and dry scabs,

losure of wounds.

The conclusion of the sterilization is the closure. Time for closure. rimary closure should be deferred. Secondary closure depends ıpon two factors:

(*a*) Bacteriological examination.

(*b*) Clinical aspect.

It is well to close a wound as soon as possible. (Closures made before the eighth day contain no scar tissue.)

Before the twelfth day skin is not adherent.

When the bacteriological count of a wound is 1 bacteria to 5 or more fields for two days in soft parts, the wound can be closed.

In fracture cases do not close until bacteriological count is not more than 1 bacteria to from 5 or 10 fields for 4 consecutive days.

Suppurating wounds should show a bacteriological count of not more than 1 bacteria to 5 fields or more for one week before closure.

Clinically the granulation tissue should appear red and smooth and the secretions sticky and colorless.

Technique of wound closure.

(*a*) Strapping with adhesive.

(*b*) Elastic traction.

(*c*) Suture.

(*d*) Skin grafts.

Where there is extensive loss of skin, Carrel uses skin grafts.

Grafts of adipose used to fill longer cavities.

Strapping and traction used when wounds are closed before the twelfth day.

After the twelfth day use sutures, if possible, under anesthesia; the edges of the skin are removed and the skin dissected free from the underlying tissue and brought together. In using deep sutures the operation is divided into three stages:

(*a*) Introduce sutures.

(*b*) Continue sterilization for two days.

(*c*) Closure.

By following the above technique 80 per cent of fresh wounds can be closed in 10 to 12 days with adhesive.

Failures of closure are due to—

1. Reinfection of wound.

2. Closure without bacteriological examination. (Smears should be taken before closure.)

3. Using deep sutures in suppurating wounds and closing at once. (Sterilization should be continued after sutures are introduced.)

4. Extensive loss of skin.

Treatment of infected fractures.—(*a*) Recent, (*b*) old.

(*a*) Four kinds, dependent upon the aspect of the fracture. Treatment the same for the first 24 hours as that for wounds of soft parts. Time for operation.

Two steps of the operation: Treatment of the soft parts; treatment of the seat of fracture. Conservatism must be practiced in the removal of bone splinters, especially as to orthopedic fragments. Periosteum must be respected.

(*b*) At the time of fistulation.—The technique embraces the following points: (*a*) Primary disinfection. (*b*) Operative treatment. (*c*) Sterilization of the site of fracture. (*d*) Closure—filling up of the cavity of the bone with different pastes and fat tissues.

(*c*) Immobilization and continuous extension are necessary for the sterilization of a wound. With infected fractures the overhead apparatus is the only one that can be used in conjunction with instillation.

(*d*) The limb upon which continuous extension is applied is placed in a kind of hammock which is suspended from above and kept in equilibrium by weights. The counterextension is made by the weight of the lifted limb.

(*e*) In the treatment of mildy infected wounds and also in certain wounds that have been previously treated by instillation of Dakin's solution, Carrel uses chloramine (chlorazene) in the form of a paste which is made up in the following proportions:

Chloramine	10
Sodium stearate	70
Water	1,000

This dressing is renewed every 24 hours and will bring about and maintain sterilization in wounds of low-grade infection.

MUSINGS DURING AN AMERICAN CRUISER'S VISIT TO THE WAR ZONE.[1]

By C. N. Fiske, Medical Inspector, United States Navy.

During 8,000 miles of semitropical cruising from the placid harbors of its Pacific island peace-time station the big ship's personnel attempts to amalgamate its Hawaiian and California National Naval Volunteers with the more youthful but consciously more experienced regulars.

Conjecture occasioned by rapid mobilization and sailing under sealed orders with decks darkened after sundown gives place to anticipation as an officer in high repute for his perspicacity reports on board for command. Later one realizes that the country is assembling her forces for war as the ship hastily docks and rushes through certain emergency repairs upon passing through the most efficiently built and administered commercial and military handiwork of the orld—the canal. Wonder and satisfaction inspire the feelings of l as the ship passing through mined nets finds herself in company

[1] This paper was prepared in June in connection with the first American Expeditionary ree. During subsequent cruises both within and outside the war zone it has been noted at most enlisted men of the volunteers have become thoroughly amalgamated with few luctions in rating and that the tension noted formerly in danger area has become axed to such a degree that resort to alarms has been suggested to keep the men alert. ficers seem thoroughly to appreciate the necessity for accomplishing the ship's missions d appear to shoulder more than their share of the responsibility.—(C. N. F.)

with strange transports in the greatest Atlantic ports, and we finally have the certainty that we are soon to take our initial part in the struggle "to make democracy safe for the world."

This is certainly not the place for the misfit officer or man who fails to appreciate that ninety-nine and more per cent of those on board mean business and have their country's interests firmly at heart, even though few or none can comprehend its destinies.

The naval militiaman soon finds that the "regular" (how new the word sounds in naval parlance despite the brief experience of '98) is willing to learn as well as teach, because at heart he doesn't think that he knows it all and comes to realize that the militiaman is not only prepared to make but is already manfully enduring sacrifices in an occupation which was in no sense his adventure as a "tin sailor" or his career in the sense of means for a livelihood for himself or his family. Propinquity occasions mutual respect and grows by leaps and bounds, and the safety of the convoy and expedition generally transcends the thought of personal safety.

Appropriately enough we bring from the Pacific our own censorship orders interpreted liberally rather than through the more rigid or restricted "health and comfort card," so easy to circumvent by designing enemies within, whom all are eager to detect though unwilling to believe in their existence in the naval service afloat. More than this, the doctors, members of the humane profession, were designated to censor the ship's personal mail and messages until the receipt of a fleet order forbidding their acting in such capacity. Who other than the doctor or chaplain is quite in the position or has the time to appreciate the undoubted facts of family relationships and the anxieties of those in humbler stations before the mast or behind the gun or stoking shovel? It is from acting as ship's censor that these musings took place after many hours consumed in scanning hundreds of pages of the innermost thoughts of typical American young manhood as it undertakes the serious responsibilities of war. Such an opportunity to hazard a composite of the psychology before the mast rarely occurs, and who shall say that this psychology differs materially in fundamentals from that more carefully repressed in staterooms and cabins? Such a composite, however, would be a mixture if not an emulsion, for there would emerge numerous incompatibilities.

Statistically the most prevalent comment has been due to elation on seeing so much of the world beyond the wildest dreams and to the regret that description of ports and shores must be deferred until censorship no longer forbids. Latterly it has seemed that the newmade sailor has been to a degree spoiled by a surfeit of so much sightseeing, with the result that if, from military considerations beyond his ken, liberty is impracticable in some port he is prone to forget that

a joy ride and "opportunity to see the world" is not his prime raison d'être, and he is, if a volunteer, after justification of more patriotic motives by his first visit to the war zone, quite ready to return to sunny California. In this latter phase is apparent his homesickness, manifested more frankly as concern for supposed dependents in balmier climes. In many cases the worry is genuine and occasioned by reduction in rating and pay through inability to justify the advanced appointments bountifully or carelessly bestowed in the militia organizations. Another grievous disappointment is failure to receive promised credit for clothing outfit, or the failure of local beneficiary societies, private or municipal corporations, to live up to the prospectus published in the heat of early patriotic fervor. Still another source of regret is his failure to appreciate from the first the importance of registering an allotment to his dependents. He is still patriotic, thoroughly so, and delighted over his volunteer status in comparison with his associates at home registering for Army draft, yet nostalgia and satiety for travel prompt the vain wish to accompany home the few who are being disenrolled on account of dependents, noncitizenship, or undesirability, even at the risk of being considered "yellow."

The regular who, by the way, on deck can hardly be distinguished from the volunteer, accepts his situation philosophically and on the whole gladly. With him, the ship being "happy" and "feeding well" the only question usually is whether he might not have a better chance for action on a destroyer or in the gun's crew of a merchant vessel. He has by no means severed his home ties and inclinations and still looks forward to his 30 days' leave on reenlistment and frequently to a substantial portion of his four months' pay before reenlistment, but he would not grumble if either were denied him, readily assuming military exigency.

Inferences of fear of death are disdainfully resented on the part of all of the considerable number who refer to it, but there is a natural and abiding concern for the welfare of dependents. The fear of deformity or mutilation from wounds and preference for death commonly ascribed to soldiers in trenches is hardly mentioned and probably rarely occurs on shipboard despite some unavoidable assumptions gained through first-aid instruction. Probably the average man on board, though not consciously a philosopher, would subscribe heartily to the sentiments of Stevenson's "Aes Triplex," or to those of Montaigne; he would be grateful to be saved the trouble of interpretation and ask any "slackers" to read it. The greater number seem to possess, if not declare, a faith in the cause and an understanding of it as delineated by national expositors, yet there is a surprising absence of bitterness against the enemy except for the sovereigns and their advisers.

A quiet and stern enthusiasm for the safety of the mission (convoy) developed in lookout and gun watches as target practice came which reached its climax upon the first encounter. A photograph of the forecastle gun's crew in real action would have been worth a small fortune to Mr. Reuterdahl and realized the ideal of some of his portrayals. In no great-gun fleet action could the faces and attitudes of desperate readiness and execution be surpassed. At this time the first realization of war law came in the immediate advancement of one subordinate to gun captain because in an emergency he knew what to do and did it when his superior failed. War reward and punishment at once gave food for thought and efficiency took another spurt.

The restrictions in criticism imposed by censorship limit one's insight in that direction, but most seem to respect their shipmates and all, and especially seasoned marines, enthused over the commissariat. It is not unfair to say that the men's food was better prepared than that of the officers. Officers' messes have steadily declined in efficiency since Chinese stewards began to disappear. This suggests the advisability of designation by regulations of a permanent ex officio commissary officer to replace the bimonthly elected mess treasurer, which duty practically every officer avoids so far as possible.

A few represented that they had conscientiously tried to avoid getting on "report," and could not understand how justice could miscarry, but generally accepted the responsibility and obligated themselves to steer clear in the future, especially if fine or disrating involved financial penalties for those at home.

Criticism of those without the ship in the ordering of the circumstances and details of her mission seemed far more prevalent among the officers who felt that, though lacking many essentials of information of existing strategy and tactics, the problems were ones on which some had put much thought and which might be their own at some future time. Inquiries and comments were earnest, good-natured, constructive, and charitable from ignorance of premises; they were undoubtedly commendable, though for the time being necessarily ineffective. Recent departmental encouragement of suggestions looking to a prompt and successful termination of the war has not appealed to the critics because of their lack of time and data.

Interest in the daily radio news was quite marked for the first few weeks, but gradually the feeling that, if anything, it was more "doped" than the newspapers has led to indifference.

Magazines and review periodicals are seized upon with avidity when at sea, those collected by the medical officers for the sick quarters being read continuously, however poor the light. More news and popular fiction journals could be used in the crew's reading

room, and all possible material of this kind should be collected to turn over to crews abroad each time opportunity offers. The want of weekly and monthly news reviews is especially felt by men on the smaller ships.

There having been no casualties out of the ordinary and but 1½ per cent of sick, observations pertaining more strictly to medicine, hygiene, and sanitation are reserved for the annual sanitary report. Three-fourths of the physical disability has been contributed by the Volunteers, who constitute but half the personnel. Only seven cases of venereal disease (none syphilis) followed liberty in Paris and a French port. The only other suggestion I have to make at this time is that commanding officers be authorized to return to mobilization stations for disenrollment on account of undesirability or *unfitness without prejudice* the same per cent of Volunteers per quarter as has been the rule for discharge of Regulars. Less than 1 per cent of misfits has been found, but for them the delay in obtaining departmental authority should be obviated in view of brief and uncertain stays in home ports.

HISTORICAL.

THEODOR KOCHER, 1841–1917.

At the editor's request Dr. Arnold C. Klebs, of Washington, D. C., has prepared the following very interesting and comprehensive characterization of the great master of surgery, who died in his native city on July 27, 1917, after a life of incalculable usefulness to the world. Dr. Klebs' sketch possesses a special interest and charm as coming from the pen of a former pupil of the great teacher.

Kocher's great success, it seems to me, is mainly due to his well-balanced utilization of the results of painstaking scientific research. He never approached any field surgically that he had not explored beforehand anatomically, physiologically, by experiment, and the statistical method. Probably no other surgeon has demonstrated so successfully and in so wide a field the possibilities of the inductive method for practical work, and the generous acknowledgment by another master in surgery, von Bergmann, in saying that from no one had he learned so much as from Kocher testifies to the appreciation of this success by his peers. But it is the rare blending in him of theoretical and practical aptitude which characterizes every step of his life work. Added to this he possessed a wonderful gift for clear expression, inducing his hearers to think and reason with him and to reach conclusions with almost mathematical precision. While his mastery of operative technique and his dexterity have brought him probably the greatest number of admirers, it is the intellectual penetration of the problems before him and their lucid demonstration in the clinic and in the literature that will ultimately determine his historical position.

The astonishing universality and versatility of his genius in devising basic experiments which logically and inevitably had to lead to definite operative measures or to conservative procedures made the strongest possible appeal to his students and promoted in them habits of thought and of action which have become the stamp of Kocher's school throughout the world. To appreciate the full meaning of this, one has to have seen him at work in his clinic. One can obtain an idea of it by a perusal of his "Operationslehre," which

also shows how successfully he brought to bear his artistic talents to the illumination of his subjects.

There can be no doubt that Kocher has made solid contributions to what may be called the tactics of surgical practice, to the refinements of aseptic technique, to hospital construction, etc. He has helped to make it possible, as Tavel jokingly pointed out, that "one may operate like a bootmaker and still all comes out all right, provided the asepsis is correct"; an impressive achievement indeed, but by itself no claim to lasting fame. Its undue emphasis only beclouds the radiant lesson to be learned from Kocher's life work, which was equally brilliant on the conservative side of surgery. His unstinted support of his pupil Rollier in his heliotherapeutic management of surgical tuberculosis on a large scale is only one case in point. And also in his operations he exercised conservative restraint, ever mindful of the Hippocratic admonition "nil nocere primum."

As regards Kocher's position as academical teacher and practitioner it has often been a subject of wondering comment outside of Switzerland that he persistently refused to accept most flattering calls to more extended and remunerative fields of activity. This faithfulness to the paternal soil he shared with several others of his colleagues who none the less achieved international distinction. The same as Kocher, Socin, Reverdin, Kroenlein, Roux found at home the most favorable and congenial surroundings, just as more than a century before the great Haller had given preference to the modest opportunities of Bern by refusing brilliant offers made to him by the King of England. The proverbial love of the Swiss for his country explains only in part this apparent anomaly in an age of intensest progressiveness. Though warmly devoted to the interests of his country and his town, his aims and his attitude were supernational; and nowhere in the world were so many natural advantages combined for the free promulgation of this attitude as in Switzerland. Its geographical position, its own ethnic composition, its entire disinterestedness in world politics create an ideal milieu for an escape from the narrowing influences of purely nationalistic aspirations. Kocher not only sought an escape from these restraining influences, but from his favorable vantage point was untiring in his exertions on behalf of the common aims and ideals of scientific medicine everywhere. His election to the first presidency of the International Surgical Association, which met in Brussels in 1904, expressed fittingly that his endeavors in this direction were widely appreciated. At the present moment, when international relationships even in scientific fields are so profoundly disturbed, this side of Kocher's manifold endeavors assumes a peculiar significance and perhaps contains a germ of hope for the future. (A. C. K.)

Sir Berkeley Moynihan, in the British Medical Journal, August 4, 1917, says: "With the death of Kocher the world loses its greatest surgeon." Another contributor to the same periodical designates Kocher one of the great makers of surgery of the nineteenth and twentieth centuries.

Dr. Harvey Cushing, speaking before the International Congress in London, 1913, said: "The accurate and detailed methods in the use of which Kocher and Halsted were for so long the notable examples have spread into all clinics—at least into those clinics where you or I would wish to entrust ourselves for operation. Observers no longer expect to be thrilled in an operating room; the spectacular public performances of the past, no longer condoned, are replaced by the quiet. rather tedious procedures which few beyond the operator, his assistants, and the immediate bystanders can profitably see."

Kocher was the "slow, careful, precise, and absolutely skillful operator, a typical scientific surgeon who obtains the completed clinical history of his patients before beginning and with whom success is an almost foregone conclusion."[1]

Lieutenant Colonel Lynn Thomas, C. B., C. M. G. (Cardiff), says: "I have seen surgeons on the Continent and in America who could operate with more speed, but I have never seen one whose judgment was so sound in the performance of daring operations where risk to life arose."

Moynihan says: "No one who ever saw him operate in a case of severe Graves' disease would ever forget his tender care, his exquisitely gentle touch, and the deft, light movement of every finger. When everything was finished the stainless towels round the wound failed to reveal the fact that an operation had taken place. Such an operation—indeed every operation Kocher ever did—was a supreme exhibition of what perfect anatomical knowledge, a blameless aseptic conscience, the most practiced technical efficiency, unfaltering courage, unruffled calm, and the most exquisite gentleness could accomplish. He was a slow operator, but there was never a moment wasted. To do an operation as he thought it ought to be done, time was necessary. Those who were privileged to see his patients in his private clinic or in the public hospital will agree that no patient suffered from such an expenditure of time as Kocher found necessary. He never wasted an instant, he never had to hurry, everything fell out according to plan, and the most sensitive tissue could hardly have been conscious of anything but a caress. Infinite accuracy, infinite care, infinite patience gave him results as near to absolute perfection as it is possible for surgery to go."

[1] Garrison: History of Medicine. Philadelphia, 1914.

Theodor Kocher was born in Berne, and at 31, after an extensive period of study, following his graduation there, he assumed the chair of surgery in the university of his native town and occupied it with supreme distinction until his death. He had prepared for this position by further study in London, Paris, Berlin, and Vienna. He was a pupil of both Von Langenbeck and of Billroth.

Looking back over his career, one is astonished by the range and variety of Kocher's achievements. Lord Lister's accomplishments in antiseptic surgery, based on the work of Pasteur, were achieved just about the time that Kocher entered upon his duties in the surgical clinic of Berne, and he immediately adopted the method recommended. In association with Professor Tavel, the bacteriologist, he developed a technique which enabled him successfully to enlarge the scope of his work in bone surgery, particularly the resection of joints. He was a pioneer in the field of abdominal surgery and was one of the early operators in Switzerland to have success in the operation of ovariotomy, first performed in that country by Sir Spencer Wells. Kocher was perhaps the first surgeon in the world to make any serious and successful attempts to employ antiseptic methods in oral surgery. This was in connection with his operation for carcinoma of the tongue. One element of Kocher's success was his utter simplicity, his lack of egotism, his willingness to learn from others. Though the author of successful operative methods in many fields, he was always prompt to recognize the superiority of other procedures. Thus he abandoned his method of removal of the tongue in favor of the Syme operation, and in the same way adopted Bassini's operation for hernia instead of his own.

He was vastly more than a mere man of hand skill. His studies in coagulation of the blood and arrest of hemorrhage were made from the chemical and physiological standpoint. He was profoundly versed in anatomy and a persistent and practical student of pathology. As a writer he was prolific, the topics covered ranging from gunshot wounds, genito-urinary disease, bone surgery to intracranial pressure, herniotomy, goiter.

Perhaps it is in connection with the thyroid gland that Kocher is most widely known. By March, 1912, he had performed 5,000 operations for goiter, but it may well be doubted if to the medical profession at large his service in this field will be as lasting and as universal as that afforded by the method he originated for the reduction of the subcoracoid dislocation of the shoulder and brilliantly demonstrated publicly for the first time at Billroth's clinic in Vienna on a case of old unreduced dislocation after every previously known method had been tried in vain.

Besides his greater and more conspicuous talents, Kocher possessed some artistic ability and considerable mechanical ingenuity.

The former gift increased his lucidity as a teacher, and by means of the latter he devised many useful instruments, such as retractors, forceps, etc., now in general use.

Kocher's capacity for work was enormous. He entered on the duties of the day at 8 in the morning and did not rest until late in the afternoon. He taught, wrote, studied, did autopsies and laboratory work, and operated daily, besides holding consultations and conducting a large private practice.

In personality he was charming. His manners were gentle and courteous. He had a rich fund of quiet humor. At home he was affectionate and kindly. In the school he was patient and considerate with the honest, laborious student, however stupid, but the ignorant, lazy, and indifferent he could not brook.

By the death of Theodor Kocher the world loses a genius but one wholly free from the foibles which are popularly connected in thought with that title. He was great for many things, but perhaps most strikingly for that rarest combination, a grasp of large issues with infinite capacity for small detail. (ED.)

EDITORIAL.

ESPECIALLY A MEDICAL OFFICER.

The attention of all medical officers is called to the Naval Digest, 1916, as a volume containing much interesting information, a considerable portion of which is indispensable for anyone who is liable to serve on general and summary courts-martial and has the ambition to dispense something better than the rough justice of the police court type.

Pages 335 to 345 contain important decisions and constructions regarding "line of duty" and "misconduct." Other interesting headings are "desertion," "drunkenness," "duty," "dying declarations," "jeopardy," "self-incrimination," "conduct unbecoming, etc.," "hearsay evidence," "jurisdiction," "epilepsy," "hypothetical questions," "resignations," "expert witnesses," "manslaughter."

The selected decisions of the Secretary of the Navy and the opinions of the Judge Advocate General, with the references to both civil and military cases, embody a mass of material of the highest interest to everyone in the service.

In a hurried review of this volume one phrase happened to catch the editorial eye and started a long train of reflections, such as would probably come to every medical reader. They are outlined here simply because the volume in question may not be immediately accessible to all the readers of the Bulletin. "Every naval officer, and especially a medical officer, whose use of intoxicants is carried to such an extent that his superiors cause him to be tried and who is convicted of drunkenness on duty should be sentenced to dismissal from the Navy, and such sentence should be inexorably carried into execution. Whatever charity or assistance may be extended to such officers should be given when they reach some other walk in life than the naval service. They are worthless members of their profession and should in every case be forced off the list of officers of the Navy."

It is not the intention of the writer to offer any criticism of the phrase "especially a medical officer," but rather to suggest it as one which every member of the Medical Corps should keep in the back of his head at all times and under all circumstances, because what-

ever becomes an officer and a gentleman should be the peculiar attribute of a medical officer, and because whatever is not in harmony with the most exemplary behavior will indeed be most conspicuously bad in a physician. It is with no purpose to comment on the technical and legal correctness of the phrase in question that it is quoted, but rather to accept it in a broad sense, to rejoice in it and to find therein something inspiring and exalting, taking it as the index of a universal underlying conception of what a physician is or should be. A drunken doctor might poison some of his patients, or be guilty of malpractice on a score of men, and in the event of some serious catastrophe might be incapacitated from rendering adequate professional services when an even larger number of patients required assistance. Whether the doctor's power to do harm through intoxication is greater than that of the officer in the line of command with authority to direct and control all the activities of the life of those under him; is greater than that of the officer of the deck on the bridge during a storm or during an engagement, than that of the navigator, chief engineer, or captain, liable, if intoxicated, to jeopardize the ship and its whole complement, is for the law to decide. The legal opinion in question is probably based on entirely different considerations which more than offset the above facts. The line officer within the sphere of his profession is an all-around man whose training makes him at once navigator, engineer, and ordnance officer, even though to increase his efficiency he may specialize in one of these lines. Should the navigator, engineer, or other responsible line officer therefore be incapacitated from duty he can be replaced in a measure by some other individual on board. The doctor stands alone. He is without substitute. When he is incapacitated there is no one to take his 24-hour watch. Should he jump overboard or blow out his brains or be put in his bunk in a stupor, the personnel of the ship can receive only the most primitive and rudimentary medical and surgical treatment, no matter what exigencies arise.

It is perhaps in virtue of these peculiar and distinctive features that his conduct assumes such importance in naval law. But there is something more. From time out of mind the physician has stood high in the respect and affectionate regard of the community, ranking "with but after" the clergyman, while in the early life of the human race the functions of priest and healer were performed by the same individual. The most outspoken critics of the medical profession sometimes cynically ascribe the respect in which doctors are commonly held, the unquestioning obedience which they usually command, and the not uncommon disposition to dogmatism on their part to the influence of this primitive association of religion and medicine. Be that as it may, the fact remains that in most com-

munities the leading physicians inspire general respect and confidence. They are accounted members of the learned professions and numbered among the prominent citizens wherever rectitude and intelligence rather than financial standing are the criterion of worth. Less openly and categorically religious than the minister, he is reputed less mercenary than the lawyer, for, however pleased and eager he may be to pocket the occasional big fee, the average physician is, in an unobtrusive and quiet way, the most universally charitable of men, answering every call and giving his services first and leaving the amount and the collection of his fee undiscussed, so that to a large proportion of his patrons the payment of it seems a matter of secondary importance and to insist upon it an unpardonable offense in the doctor.

The doctor on a ship stands alone, and from being especially conspicuous it follows that he must be especially circumspect, not only for his own sake but because he represents on that ship the whole Medical Corps, and because as his reputation gains or suffers the reputation of the entire medical profession gains or suffers as well. We decline, therefore, to take issue technically with the legal pronunciamento cited above, but joyfully accept it as a recognition of the moral obligation resting on the physician to live, not by a standard established relatively to that of his associates but rather by an absolute standard independent of practices or traditions, based on immutable principles of uprightness and duty.

THE STONE WHICH THE BUILDERS REJECTED.

Every now and then a cover with a strange title makes its appearance among the periodicals accumulated on the desk. No. 4, volume 19, of the Star-Bulletin, published by the inmates of Sing Sing Prison, is largely devoted to advocating that convicts be drafted into the military forces of the United States for the present war. The picture on the cover is in itself an argument of some force. Columbia, with a rifle in her hands, stands between a slacker hiding behind a woman, on one side, and a prisoner with broken shackles reaching for the weapon, on the other.

At first blush the thought of enlisting men who bear the stigma of the penitentiary is revolting. For years military authorities have protested against the too frequent practice of certain police magistrates who offer to a culprit the choice of a fine and a workhouse sentence or of enlisting. Such action has been resented on the ground that the Army and Navy were not organized as reformatories, and the objection still holds good.

In the present instance, however, the proposition is very different. The force of some of the arguments advanced in the pages of the

Star can not be admitted, but there is something to be said in favor of the main contention. The fact that John Bunyan composed The Pilgrim's Progress while imprisoned on account of his religious views, and that Socrates, Galileo, and a host of statesmen, philosophers, scientists, and writers suffered death or durance vile because their opinions were not in harmony with the prevalent ones of their day can not be adduced in palliation of offenses committed against moral and criminal law about whose importance there has been no difference of opinion from the earliest times. Murder, rape, and the unnatural crimes have always been held in horror by the state and the individual and always will be. What exact degrees of misconduct and what violations of law should exclude enlistment we will leave to the lawmakers, who would in any case have to modify the present legal restrictions governing enlistment.

We must, however, recognize the great changes as to methods of punishment which have come with advances in civilization. Even up to the seventeenth century the list of offenses which entailed the death penalty was an appallingly long one and included many relatively trivial things. To us who live in a land of free speech and an unbridled press it is almost inconceivable that men used to have their ears cut off, their eyes gouged out, etc., for irregularities of conduct that to-day would excite little more than an unfavorable comment in a newspaper or a letter of protest from one of its subscribers.

The object of punishment being twofold, to discourage crime in others and to restrain or reform evil propensities in the punished, the law should be satisfied if both conditions are fulfilled, but we know that in actual practice the law is content with much less, because the reformatory function of our prisons is limited indeed. We are satisfied in the main to consider that a debt against society has been discharged when the legally imposed punishment has been carried out. Should the needs and circumstances of society at large be at any time so modified as to permit the culprit to fully discharge his debt by some other method than that of undergoing imprisonment, then society would be justified in permitting the liquidation of the debt by that other method if it also provided a wholesome lesson to those inclined to sin. A man meditating a crime knows that he incurs a serious risk to life. No man can go to war, to such a war as the one now convulsing the world, without realizing that in so doing he puts his life in jeopardy and faces what is perhaps worse than death, the possibility of detention in a German camp for prisoners.

If by undergoing his legal punishment the offender's debt is paid, then, when he leaves the prison, he should be square with the world. If, when he has paid his debt, society refuses him the rehabilitation which represents, as it were, a receipt for the payment he has made,

then the situation is reversed and society becomes his debtor instead of his creditor. As to the complete rehabilitation of the time-expired man there can be no two opinions. Society looks askance at the discharged convict and points the finger of scorn at him. The employer turns him away from his shop with scant civility, and unless he has been a robber of millions the door of the drawing-room is closed against him. Let such a man publicly seek the confidence of the community and no matter what standing he may deservedly have attained in it the faintest whispered reference to his past puts him at once outside the pale. And yet we know that, however fallacious as a system of reformation imprisonment may be, many of the men branded as irredeemable sinners had and still have much good in them; many of them fell through momentary weakness and they leave the prison walls not only with good intentions but with purposes implanted on real moral growth. If circumstances were favorable they would regain all that they have lost and would surpass in useful achievement many men whose souls have never been purified in the flaming crucible of sin and retribution.

Society's greatest difficulty in properly handling the criminal is to provide favorable conditions for his rehabilitation. Life in its ordinary course does not furnish to sinners in whom the good is struggling to surmount the bad the needed opportunity to demonstrate the survival of the original good and its increment of gain and so to win the confidence and trust indispensable to further advancement and accomplishment. We have no suggestions to offer as to the measures which could be adopted for this purpose in ordinary times, but it is clear that just now the life of our people is profoundly altered, as is the life of millions of others with whom we are in touch socially and politically. The great upheaval of universal war is affecting individual fortunes, position, and character. Standards are being remolded, values reestimated, social barriers lifted. Throughout all time war has been the great leveler. It brings down kings from their thrones and raises men of low degree to the highest pinnacles of honor and power. True merit, however modest its garb, comes to the front, and incapacity, stripped of its trappings and caparisons, drops to its proper level. In the general fermentation of affairs which accompanies experience of sorrow, distress and want, due to war, we rewrite the lists of our friends, our eyes are opened to see virtues where we least expected them and we even find that those most to be trusted are among the outcast and the despised. We may look in vain for courage, fidelity, and patriotism to the sources from which we have been wont to demand these qualities, and discover them blossoming in beauty from a soil as rich in the essentials of courage, steadfastness, and loyalty as it is black in outward appearance.

If we regard the criminal as having incurred a debt to society it is inconceivable that circumstances could ever arise so fertile of opportunity for the liquidation of that debt as those of the present moment. We have embarked upon a war which must inevitably affect in a profound and unusual degree every inhabitant of the country. If we are to carry it to a successful issue, it can not be fought by a military class. In our case this would be a limited and one-sided effort and prove our undoing by implicating us without giving the guarantee of victory. Every energy must be called into play, and if we have any realization of what lies before us in the struggle we can not afford to spurn any real and legitimate help nor allow thousands of able-bodied men eager to help to remain in the unproductive class. Even though we declined to consider the possible right of the convict (a man may forfeit his citizenship, but what power of law can eradicate from the human breast a love of country and the triumphing sense of obligation to it), can we decline to utilize any and every justifiable measure for the attainment of our purpose? The man who seeks military service in spite of a sinful past and a long period of sequestration from his fellows in the full consciousness, on the one hand, of his physical security within prison walls and of the shadow that will rest upon him at the front until he has made good, and, on the other, of the incalculable hardship and suffering which his military service will entail even if it does not involve the loss of his life, should be considered for enrollment.

So much for sentimental considerations, which we believe will find acceptance with the majority of our citizens, who naturally and most pardonably would close the discussion at this point. To the criminologist and to the medical officer of the Government, however, who may have shown a freedom from prejudice by consenting to the general proposition hitherto advanced there presents itself now the most difficult phase of the question. What shall be the principles on which enrollment shall be conducted and what shall be the type of duty assigned to the men who are to emerge from the shadow of the prison?

For a number of years the medical officers of the Navy have been endeavoring to reduce to system and formula the exclusion from the service of the mentally unfit. It will be manifestly absurd to put medical officers to work in training camps and recruiting offices to weed out defectives and potential criminals on the one hand (and there has been recently an increasing pressure from the outside to make this exclusion more complete), and on the other to accept from our penitentiaries those whose conduct has given practical demonstration of their undesirability for military duty on account of instability of temperament and limited capacity for that strong inhibition, without which discipline is impossible and barbarity a cer-

tainty under the strain of campaigning. It would be something more than puerile to reject at the recruiting office the epileptic liable in a fit to fall down a hatch or get in the way of machinery and to receive the man whose diseased brain may lead him to slay his messmate through ungovernable rage over a trifling affront.

We have alluded in another paragraph to the distinction between types of offenses, and this should be significant chiefly, as it refers to the cause of crime. Dally, after studying the subject for 20 years, reported that criminals subjected to autopsy after execution showed, in every case observed by him, evidences of cerebral injury. Our standards must be both anatomical and physiological and above all psychological, and we must distinguish the relapser, the habitual, incorrigible, congenital criminal from those occasional criminals "who do not exhibit or who exhibit in slighter degrees the anatomical, physiological, psychological characteristics which constitute the type described by Lombroso as 'the criminal man'" (E. Ferri). These occasional criminals "are in a special degree a product of physical and social environment which has persistently driven them into criminal life by their abandonment before and after the first offense, and which especially in the great towns is often forced upon them by the actual incitement of their parents" (Ferri).

Again, at a time when the long practiced endeavor of Government agencies toward increased morality in Navy and Army is being powerfully reinforced by civilian agencies it would be highly undesirable to incorporate in our fighting force men convicted for rape, sodomy, indecent exposure, who would not only have a disastrous influence upon their associates, but would find in war conditions abroad increased incitement to and unusual opportunity for fresh sin.

Personally we are in favor of enrolling both the feeble-minded and the criminal, but for distinctly graded service. To the fighting forces we would assign the honorable élite of such able-bodied prisoners as gave promise of reform, based on a study of (1) the nature of the offense, (2) the history of behavior during confinement, (3) the results of medical examination by experts. Another class would be available for many forms of manual labor at home, in mines, forests, industrial centers, and, finally, those for whom the safety of society demanded the strictest surveillance would make shoes, clothes, haversacks, belts, and the countless other necessities of soldiers, regardless of the protests of this or that industry. We can not afford, at a time when the excuse for fabulous prices is given as shortage of food, lack of labor, etc., to maintain in comparative idleness men who have broken the law, while the honest, upright citizen is driven to endure hunger and increased taxation. We should not

heed the howls of those who would fatten off the perils of the Nation, who report that the crop of peas, for instance, is smaller than ever, and put up prices on that account, though there is reason to believe that the canners have increased their output of canned peas by a million cases; who would conceal the nutritive value of Government-inspected oleomargarine because dairymen would complain, though already unable to meet the demand for dairy products.

Because a recruit is constitutionally unfit to endure the shock of battle does not mean that he can not be of service, and we could give these feebler folk a uniform and a task at home commensurate with their abilities, just as we make boy scouts of the eager lads not yet physically mature for marching and the exposure of the trenches. This is in line with the suggestions regarding tuberculosis suspects outlined by Dr. Arnold C. Klebs in his article Tuberculosis and Military Organization (U. S. NAVAL MEDICAL BULLETIN, Vol. XI, No. 4).

In the matter of *food* conservation and economy (the source of energy) the country is doing a great deal and the work is conducted by civilians. In the matter of conservation, economy, and utilization of *energy* there is room for infinite endeavor, and this should be planned and conducted by civilians. In our present critical situation the patriotic citizen, the patriotic professional man, the committee, the society, the league should not aspire to substitute or rival the existing instrumentalities of government working on lines for which they are trained, and in technical fields with which they are familiar, but rather should devote themselves to the development and expansion of new activities.

To the lawyers, criminologists, psychiatrists of the country we respectfully submit the problem of drawing up and putting into execution a widely comprehensive scheme for the immediate tabulation, classification, and systematic utilization for war purposes of the physically, mentally, and morally feeble of the State, who all have a capacity for service which, if properly directed, is enormous in the aggregate. To the men fitted by special knowledge and position to undertake this task we appeal for a display of the same patriotism, the same perseverance, the same courage and indifference to personal loss which characterizes our men at the front. We suggest that they proceed to a census of the criminal or prison class and of the feeble-minded of the country, dividing them into three categories: 1, For the front; 2, for heavy manual labor, under guard, if necessary; 3, for industrial employment. We would put class 1 into Army and Navy uniforms and classes 2 and 3 into distinctive uniforms, which would show at a glance that, whatever their previous disabilities or present limitations, these men were doing their bit for their country.

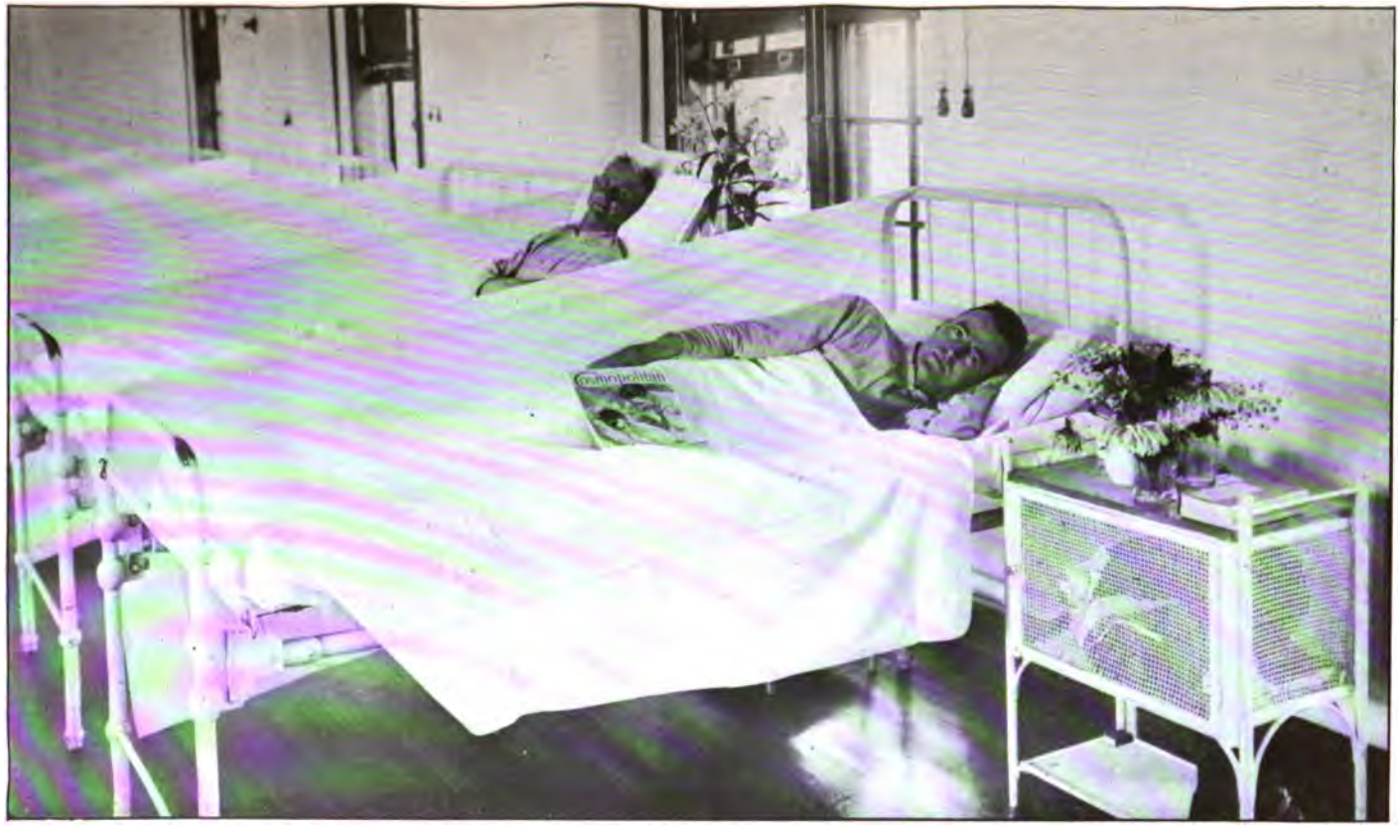
In our enthusiastic desire for an efficient personnel we are in danger of straining at a gnat and swallowing a camel, of requiring physical perfection for all forms of duty when only certain employments require such perfection, of exempting men from military service as though military service could be rendered only in the trenches. In point of fact military service includes a score of diverse forms of effort analogous to, nay, identical with, work being done in civil life. Whenever some factory hand is rejected for military duty because of a physical defect which has not interfered with his earning a wage in the factory and identical work is needed in the theater of war a fighting man must be diverted to work which the rejected or exempted man could have performed perfectly. It is not enough therefore to expand our forces numerically in order to win unless our capacity for numerical expansion is unlimited and we are utterly indifferent to the price we are to pay. There must be such intelligent expansion as will secure the utilization of every available working unit through classification of material and appropriate distribution of duties. Without this there will ensue a fearful waste of energy, and to our shame be it said that hitherto as a people we have been wasteful beyond all others.

Without having had any very active participation as yet in the fighting we are already feeling the pinch of economic disturbances and squirming under it, and some of us realize that the pressure of financial problems will become almost unbearable as time goes on.

One of the causes of the universal rise in prices is ascribed to shortage of labor. Does this shortage actually exist so far as ordinary industries are concerned? We believe that to some extent the shortage of labor in various forms of civilian enterprise is due to the high prices paid for labor in urgent Government enterprises. To what extent could this be remedied by drafting to perform Government industrial service men incapable of fighting-line service, and by paying reasonable wages, higher than the wage of the poorly paid fighting line but below the enormous emoluments generally demanded? Soldiers will always be underpaid, even by the United States, the most generous employer of them, for endangering their lives, because their numbers are such that proper remuneration for the risks they incur would break any Government. On the other hand, the relatively small number of skilled artisans can compel better wages, but there should be a limit to what they are allowed to demand, and as competition and the laws of supply and demand are the fundamental factors that determine wages, we must see to it that no considerable number of able-bodied men remain idle. Let us therefore empty the prisons and devise a system by which every offender shall henceforth contribute work for the benefit of the Nation. That such a step will liberate a

by no means insignificant army of potential workers is manifest when we remember that in 1910 the number of persons, including juvenile delinquents, committed to jails, prisons, penitentiaries, and reformatories in the United States reached a total of 479,787.

It is certain that we shall have to resort to many unusual methods before victory is won, and it is indispensable that we plan now, even if we can not yet actually initiate, changes in administration, which, however radical, can scarcely be more novel or startling than what has already come to pass—conscription for military enterprises conducted 3,000 miles from home.



BEDSIDE SCREEN IN USE AT NAVAL HOSPITAL, NEWPORT, R. I.

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SUGGESTED DEVICES.

BEDSIDE SCREEN.

By M. F. Gates, Medical Director, United States Navy.

The accompanying illustrations show a bedside screen curtain which I have used at this hospital for several months.

The screen consists of a plain piece of bleached muslin, hemmed at each end, and with a "header" at one side. Through the header is run a piece of white line. To one end of this line is secured an ordinary brass picture hook of light metal. This hook is caught over the foot rail of the bed. The other end of the line is secured to the head of the bed at the junction of the first upright rod with the tubular frame, either by a slip knot or a light hook, in such a manner that the end of the screen comes slightly around the head of the bed. The tension is such that the picture hook can be readily slipped from the foot rail and the screen thrown over the head of the bed or removed entirely, as may be desired, when necessary to work at that side of the bed.

The screen is placed on one side of the bed only. It therefore does not interfere with the patient getting out of bed nor with ordinary care being given by attendants. The use of this screen gives some privacy to patients, while not interfering with the general supervision of the ward by nurses. It conduces to cleanliness and lessens the chance of infection being conveyed from patient to patient by coughing. It also individualizes the bedside locker, which otherwise is frequently used by patients in adjoining beds, and prevents the accidental or careless use in common of drinking glasses and other articles which are placed on the stand. Its use in the naval hospital, Newport, R. I., has proved very satisfactory.

A SMALL STETHOSCOPE BELL.

By E. F. Du Bois, Assistant Surgeon, United States Naval Reserve Force.

The hard-rubber Hollis stethoscope bell used by most of the profession in New York has excellent acoustic properties but certain

mechanical disadvantages. The bell, with its holder, is so long that one can not thrust it beneath a patient's clothing or under the back of a man too sick to turn in bed. Several years ago Dr. W. Gilman Thompson devised a small bell with large caliber tubing and Dr. George Draper modified this by adopting the shape and size of the Hollis bell. About nine years ago the writer, in turn, modified the Draper stethoscope and bent at right angles the tubes to which the rubber is attached. This makes the stethoscope as handy as the Bowles model. It is particularly well adapted for listening to the arterial sounds when taking the blood pressure, and is very convenient when examining patients partially dressed. It can also be used to listen to the back of a pneumonia patient when it is not desirable to turn him in bed. Being made entirely of brass, it is unbreakable. Except in very cold weather, the contact of metal with skin causes no inconvenience on the part of the patient.

The acoustic properties of this bell are the same as those of the standard Hollis bell. The instrument has practically all the advantages of the Bowles patent stethoscope without the annoyances of false râles, cracklings, and changes in the character of the sounds. Like the Hollis bell, it is inferior to the Bowles instrument in the detection of very faint, soft diastolic murmurs, but the Bowles stethoscope itself is not nearly so good as the naked ear in the detection of this important murmur. Men who use the Bowles or any other stethoscope alone and never use the naked ear will miss many important physical signs.[1].

ENTRY OF VACCINATION AND TYPHOID PROPHYLAXIS ON COVER OF HEALTH RECORD.

By R. B. Henry, Passed Assistant Surgeon, United States Navy.

Much time is lost in checking up vaccination and the administration of typhoid prophylaxis by the necessity in each case of finding the particular entry, which is usually buried away in an obscure place among the back pages of the health record. This involves much useless labor and delay every time a draft comes aboard or when men are received from another ship or station, and even though the records are carefully checked up they may accidentally become mixed with others and then all will have to be gone over again, a useless duplication of work. To avoid this waste of time it is recommended that each health record bear conspicuously in a selected place on the outside of the front cover the words "Typhoid prophylaxis completed, ------," date being given, to be stamped thereon immediately after completion of the last injection. The entries could then

[1] During the last nine years this bell has been made by the W. F. Ford Co., 118 East Fifty-ninth Street, New York City. There is no reason why it could not be made by any good mechanic.

Du Bois—Stethoscope Bell.

SMALL STETHOSCOPE BELL.

be readily seen as the records are quickly gone over like a pack of cards.

The question of similarly recording vaccination against smallpox is slightly more complicated. A simple stamping of "Vaccinated" would not be sufficient, as the vaccination might not "take" and the entry would not show protection. If a stamp were used having the word "Vaccinated, ------," leaving space for dates of any vaccinations, and immediately below it the words "Number of pitted scars, ------," the blanks being properly filled in, the entire matter would be clearly shown. An important point in connection with the use of this suggested plan of entries is that if a health record not having these entries on the cover is handled for any reason at all the omission immediately suggests an investigation to ascertain the cause, while under the present system of recording on an inside page only, the health record of an unvaccinated man, or one who had not received typhoid prophylaxis, might pass through innumerable hands without any attention being called to the missing entries, and the man might altogether escape vaccination or the typhoid injections.

Any entry which should appear on every health record should be placed on a part of the record where its absence would be immediately noted at any time the record is handled, and the place that best fulfills this requirement is the outside of the front cover.

PORTABLE URINAL FOR CAMPS.

Devised by W. L. Mann, Passed Assistant Surgeon, United States Navy.

The portable day and night urinal is intended to be set up at night in the company street. After reveille it is cleaned, sunned, and removed to a fly-proof urinal tent for day use. Weight, 25 pounds. Three urinals are allowed to a company. Each accommodates several men at a time. The contents of the buckets are volatilized in the camp incinerator. This device is in use at Quantico, Va.

CLINICAL NOTES.

CHRONIC PANCREATITIS: CHOLECYSTOSTOMY AND RECOVERY.

By F. W. HARTMAN and B. H. HAGER, Assistant Surgeons, United States Navy.

L. K. H., private, U. S. M. C., entered the service on September 13, 1915. Health has always been good and his family history is unimportant. He had a primary venereal sore in December, 1915, but has never had any secondary manifestations of syphilis.

While on duty in Haiti, June, 1916, the patient had a severe illness of two weeks duration. During the first week there was marked jaundice, nausea, vomiting, loss of appetite, and an irregular temperature. Each day there were two or three attacks of stabbing pain in the upper right quadrant, lasting from 15 to 30 minutes. None of these attacks were experienced in the second week, and the jaundice rapidly cleared up with a partial recovery.

A diarrhea developing in the above described attack continued with acute symptoms in October, 1916, and again in December, 1916. The stools were always semifluid and foul smelling, but during the acute attacks 8 or 10 per day were passed which contained blood and mucus. Repeated examinations of the stools showed no ova or parasites. Therapeutic tests of quinin and emetin hydrochlorid were given without appreciable benefit, hence the patient was transferred to this, the United States Naval Hospital, Washington, D. C., March 28, 1917, with a diagnosis of chronic enteritis.

Improvement upon a milk diet was such that a discharge was given after 30 days. On July 2, 1917, the patient again entered this hospital, all his symptoms having returned in more severe form.

Physical examinations.—Showed a man with marked emaciation and shallow muddy complexion. There was no jaundice.

Chest.—Heart and lungs negative.

Abdomen.—No rigidity of abdominal wall. No masses felt. Liver edge even with costal margin on right side. Spleen not palpable.

Blood pressure.—Systolic, 116; diastolic, 65.

Blood.—White blood cells, 6,000; red blood cells, 2,152,000; hemoglobin, 65 per cent; Wassermann, negative.

Urine.—Negative.

Feces.—Foul smelling, semifluid, and grayish yellow in color. Microscopical examination showed undigested meat fibers and numerous fatty acid crystals.

Pancreatic disease being suggested, some of the duodenal contents was drawn off for analysis. This was thick, tenacious, and light green in color. Standard tests demonstrated almost complete absence of the normal pancreatic ferments.

The frequent association of chronic pancreatitis with gall-bladder disease being generally recognized, and the early history of this case being suggestive of gall-bladder involvement, cholecystostomy was decided upon and performed by Surgeon H. F. Strine, United States Navy, July 14, 1917. The gall bladder was found to be contracted, its walls were thick and fibrous, and it contained dark brown tarry bile. No gallstones were present. The pancreas was shaped like a tadpole, the head being markedly enlarged and indurated.

The post-operative course has been uneventful. The draining bile is now of normal color and consistency. The patient has gained about 40 pounds in weight, and now, three months after the operation, is apparently well in every respect.

Of the accepted etiological factors concerned in the production of chronic interlobular pancreatitis, the most plausible in this case would seem to be an ascending infection involving both the pancreas and gall bladder, inasmuch as there were no calculi found at operation.

A NEW METHOD OF TREATING TROPICAL ULCERS.

By J. A. Halpin, Assistant Surgeon, United States Navy.

In past years much has been written on the subject of tropical ulcers, embracing in detail the causative factors, both predisposing and exciting, the theories as to why they are prevalent in tropical climates, and why their response to ordinary treatment is far from encouraging. These various factors have been taken up in detail in the works of Castellani, Chalmers, Manson, and Stitt.

The object of this paper is not to outline any new conditions found, with the possible exception of the often stated syphilitic origin, but rather to report the cases, the methods used, and the conditions found in a series of patients under observation.

In the native clinic at Canacao Hospital the number of patients who come for medical and surgical treatment has averaged above 1,000, of which a large percentage have the so-called tropical ulcers. For the preparation of this paper 35 cases were selected for experimental purposes, picked at random as they appeared at the clinic. Their ages varied from 1 year to 74 years. The cases selected were those whose condition had existed for six months or longer, and

whose ulceration was 2 inches or more in diameter. The following things were noted on examination:

1. In over 85 per cent the ulceration was on the left leg.
2. The situation of the ulcer was at or near the inner malleolus in 60 per cent.
3. In the majority the ulcer was painless.
4. When discharge was present it was usually thick, tenacious, and very offensive.
5. An inflammatory zone was present in only 1 per cent of cases.
6. The edges of the ulcers were thick and usually rolled inward with a tonguelike projection in the center.
7. The body temperature was normal or only slightly elevated, never above 100 F.
8. A positive Wassermann was present in only one case. It is very rare to obtain a positive Wassermann. Of special interest is the fact that in over 80 per cent the ulcer was on the left leg. The probable explanation of this condition is that these people, when standing or squatting, bear most of their weight on the left leg, thereby causing a venous stasis, interfering with the return blood supply. In every case a Wassermann test was done, the Noguchi, checked up with the Emery method. This was done in order to ascertain the origin, and also to see if the majority were syphilitic, as has been claimed by previous observers. Strange as it may seem only one case gave a triple or strong positive reaction. The rest were all negative. The *same results* have been found in other cases tested which have not been noted in this paper.

Tropical ulcers, as is known, have been treated by various remedies, and this has also been done at this clinic. The favorite form of treatment when I took over the clinic was cauterization with phenol and alcohol, then putting on a dressing of iodin, balsam of Peru, or ichthyol.

If there was much foul-smelling discharge iodoform was used as a deodorant. The ulcers, however, failed to respond, and if any improvement was noted it was very slight. In the majority of cases the ulceration tended to spread rather than heal.

In order to ascertain the best method of treatment three methods were instituted, as follows:

Eleven cases, including the positive Wassermann case, were treated first thoroughly curetting the ulcer and applying mercurial salve, per cent. They were also given mercury salicylate, grain 1, twice week intramuscularly. This form of treatment was kept up for o months.

The next method of treatment was the vaccine method. Eleven es were selected and a culture made from the discharge by placing

a piece of sterile gauze over the ulcer so as to absorb it. This was washed with sterile salt solution and filtered. The filtrate was then collected and put up in vaccine form. An autogenous vaccine was also made. The germs most frequently found were the staphylococcus aureus and albus. The cases were injected every five days with graded doses. The ulcers were curetted and covered with sterile gauze. This method was kept up for two months.

The third method of treatment was as follows: Thirteen cases were selected and the ulcers thoroughly curetted and wiped off with sterile 0.6 per cent NaCl solution. Then a 20 c. c. syringe was filled with the same solution and the contents injected beneath the ulcer, the needle entering just at the margin of the ulceration and going deep enough to prevent the solution from oozing through, which very easily happens, due to the porous condition of the floor of the ulcer. After injection the ulcer bulges and remains so distended for about one hour. It was then covered with sterile gauze saturated with the same solution. These injections were given daily as long as the ulcer persisted.

Results.—The first series of cases, namely, those which were treated with mercury injections and mercury salve, did not respond to treatment, and at the expiration of two months were the same, or, as in five cases, increased in size. The discharge was also increased. In the second series, those which were treated with autogenous vaccine and filtrate, the discharge was decreased. None of the ulcers, however, healed, and only slight improvement was noted. In the third series, those which were treated with the saline-injection method, every case responded to this form of treatment and healing took place as follows:

No.	Name.	Age.	Duration.	Size.	Treatment started.	Cured.
		Yrs.		*Inches.*		
1	P. M.	70	7 months	3	July 3, 1917	July 27, 1917
2	S. P.	25	6 months	4	.....do.....	July 31, 1917
3	F. F.	15	8 months	3	.....do.....	July 25, 1917
4	T. P.	17	1 year	4	.....do.....	July 16, 1917
5	L. B.	12	8 months	3½	July 12, 1917	July 31, 1917
6	A. C.	29	6 months	4	.....do.....	July 19, 1917
7	S. D. S.	14	.....do.....	2	July 14, 1917	Aug. 8, 1917
8	Q. M.	12	.....do.....	3	.....do.....	Aug. 20, 1917
9	C. P.	50	.....do.....	2½	July 15, 1917	Aug. 14, 1917
10	H. M.	6	7 months	2	.....do.....	Aug. 11, 1917
11	A. C.	9	15 months	2	July 16, 1917	Aug. 6, 1917
12	L. S.	1	6 months	2	July 20, 1917	Aug. 12, 1917
13	A. A.	14	.....do.....	2½	July 21, 1917	Aug. 15, 1917

In the majority of cases the cure was very rapid and permanent, the old edematous tissue surrounding the edges of the ulcers disappeared rapidly and was replaced by healthy tissue, the discharges ceased, new healthy granulation tissue soon covered the ulcer and healing resulted.

In order to check up the cases and to see with certainty that the cure resulted from the saline injections alone I proceeded as follows: The cases that had received the mercury injections were not given any form of treatment for one month, so as to allow time for any beneficial results that had been derived from the mercury to wear off. At the expiration of the month the ulcers were examined. They presented the same appearance as when last seen, with the possible exception that the discharge had lessened, which I think can be attributed to the fact that they had been kept clean, and not to any beneficial process exerted by the mercury treatment. The ulcers were then treated by the same method as the third series; that is, daily injections of 0.6 per cent saline and covering with sterile gauze saturated with the same solution. After this form of treatment was started the ulcers began to heal rapidly, and all had cleared up so that they were discharged as cured in from two to three weeks. The same method was applied to the cases treated by the vaccine method, one month being allowed to expire before starting saline injection treatment in order to see if any benefit was derived from the vaccines. The ulcers were at the expiration of this time examined and their condition noted. Very little improvement had taken place. These were then treated with daily injections of saline in exactly the same manner as has been outlined for the preceding cases. All of these cases were permanently healed in from two to five weeks.

Another very interesting case, and one that showed the good results obtained by this form of treatment better than any other thus far outlined, was an American sailor admitted to the hospital from China, who had had an ulcer on his left forearm for two years, beginning June, 1915. According to his health record and his own statement, every form of treatment had been applied without any apparent beneficial results.

The ulcer was about 1½ inches in diameter and approximately one-half inch in depth. The edges were thick and undermined so that it presented a specific appearance. Wassermann test, however, on three occasions was negative. The saline injection treatment was started on June 10, 1917. The ulcer healed and the man was discharged to duty, well, on June 19, 1917, just nine days later.

The beneficial results, and the quickness by which the ulcers responded to this form of treatment may be summed up as follows:

1. The injection of saline under the ulcers washes them from within outward, thereby tending to remove infection.
2. It produces and increases amount of lymph to the part, thereby furnishing an increased number of leucocytes.
3. The change of osmotic tension stimulates the sluggish tissues.
4. It produces a local leucocytosis, which combats infection.

5. It abstracts fluid from the surrounding tisues, increasing the blood supply to the affected area.

In conclusion I may add that this has been adopted now as the routine form of treatment of tropical ulcers at this place. The benefit derived has corresponded with the results obtained in cases used in this experiment.

I wish to thank Chief Pharmacist's Mate Lindsley, United States Navy, who helped me in performing the Wassermann tests and making up the vaccines, and by many valuable suggestions during the course of the experiment.

SUBDURAL HEMORRHAGE IN CEREBRO-SPINAL FEVER.

By U. R. Webb, Surgeon, United States Navy.

From July 1, 1916, to September 27, 1917, there have been treated in this hospital 16 cases of cerobro-spinal fever. In this series of cases there were four deaths, and in three of the fatal cases the autopsy findings have seemed to us to be of sufficient interest to warrant report. In each of two cases there was found a large, thin subdural hemorrhage over one hemisphere; in the other there were numerous punctate hemorrhages over the whole brain surface.

Gram negative intracellular diplococci were demonstrated in each case in smears made from the spinal fluid. There was no history or evidence of external injury in any case.

Following are extracts from the case histories and autopsy reports:

J. W. D. A–S.—Admitted at 2.30 p. m., February 16, 1917, with well-marked symptoms and physical signs of meningitis. His condition was good and seemed in no way desperate. His health record stated that spinal puncture had been made and that an undetermined amount of antimeningitis serum had been injected. Spinal puncture was made soon after admission to hospital and 20 c. c. of cloudy fluid were withdrawn and 15 c. c. of serum injected. Reaction was satisfactory and his condition was considered excellent until 8.55 p. m., when he suddenly died from respiratory failure.

Autopsy findings.—Brain edematous, marked engorgement, a large subdural clot over left parietal region, otherwise negative.

W. C. H. A–S.—Admitted on the afternoon of May 20, 1917, with well-marked symptoms and physical signs of meningitis. Spinal puncture was made, fluid withdrawn was cloudy and was positive for gram negative intracellular diplococci. Twenty c. c. of antimeningitis serum were injected. The patient rested well and seemed to improve during the night, but died suddenly at 5 a. m., about 12 hours after his admission.

CHANCROID TREATED BY DAKIN'S SOLUTION.

Autopsy findings.—Dura injected, edematous and dull in color, numerous punctate hemorrhages over whole brain surface, convolutions flattened and edematous, other organs normal.

E. T. A–S.—Admitted with measles on June 1, 1917, his convalescence from this disease was slow, and he was still under treatment in hospital when on July 10 he developed a temperature ranging as high as 104°, photophobia stiffness and soreness in muscles of neck and back with marked Kernig's. Spinal puncture revealed turbid fluid containing many meningococci. Forty c. c. spinal fluid removed and 30 c. c. antimeningitis serum (New York State Board of Health) injected by gravity method. Patient reacted well to treatment until 18 hours after, when his pulse was noticed to become weak and irregular. This condition did not respond to stimulants, and he died 21 hours after receiving serum. Autopsy revealed a large subdural clot over left parietal region, entire surface of brain intensely congested; sinuses contained a small amount of cloudy fluid. All other organs were normal, except for hypostatic congestion of lungs.

DAKIN'S FLUID IN THE TREATMENT OF CHANCROID.

By W. A. Bloedorn, Passed Assistant Surgeon, United States Navy.

The value of Dakin's fluid in the treatment of lacerated and infected wounds has been established beyond question, and its use in the present war has undoubtedly resulted in much saving of life and limb.

While it appears to have its widest range of usefulness in the treatment of infected wounds of the present war, it has also gained an important place in the equipment of the civil practioner and will remain after the war as one of the most effective means of combating the infection resulting from wounds of civil life. No doubt its range of usefulness will increase, and as a possibility in this direction a report of its use in the treatment of chancroidal infection may be of interest.

In chancroidal infection we have an acute ulcerative process appearing a few days following exposure. The lesions are usually multiple, are autoinoculable, show a remarkable ability to destroy tissue, and are often followed by an inguinal adenitis. The inguinal glands frequently break down and suppurate, causing much inconvenience and loss of time to the patient. The chancroid appears as an irregular ulcer, with a sloughing, purulent base, tender to the touch and with much purulent secretion. The character of this lesion would suggest the use of Dakin's fluid.

It was first tried in a case of multiple chancroidal infection of inner surface of prepuce. This case reported with a beginning phi-

mosis, which quickly became complete with much edema of prepuce and elevation of temperature to 103.8 F. The lesions were exposed by a dorsal slit of prepuce. The entire field was copiously irrigated with Dakin's fluid and a large gauze dressing applied, moistened with Dakin's fluid. The solution was poured over the dressing every hour and the entire dressing changed daily. At the end of the second day the temperature was normal, the ulcers had ceased to spread, and the necrotic and devitalized borders had become detached, leaving a healthy granulating surface. The lesions continued to heal rapidly. No inguinal adenitis developed.

Following this result Dakin's fluid was used as a routine treatment for all cases of chancroid occurring aboard ship. All cases were copiously irrigated daily, followed by a moist dressing of Dakin's fluid, and the dressing kept moist by frequent additions of the solution. The solution when kept constantly applied in this manner produced no irritation of the skin and caused the patient no inconvenience. It appears that this treatment promotes rapid healing of the ulcers, prevents further destruction of tissue, and lessens materially the tendency toward the development of buboes. The benefits of this treatment may be summed up as follows:

1. Rapid separation of necrotic and devitalized material in the ulcer.
2. The production of a clean, granulating base, which heals quickly.
3. A lessened tendency to inguinal adenitis.

TETANUS IN HAITI.[1]

By G. L. Wickes, Surgeon, United States Navy.

Five consecutive cases of tetanus have been treated by medical officers of the Navy in the Civil Hospital of Port au Prince, Haiti, with a record of 100 per cent recoveries. The last case reported was in an infant 1 month old. The child was born at home, being delivered by a native midwife. The tetanus was the result of infection of the navel cord. The procedure in each case consisted in the use of antitetanus serum, followed by Bacelli's treatment.

There is a general reduction in the number of cases of malaria in the city, though it remains constantly present. At the Maison Centrale, an industrial school for boys, the splenic index for malaria is 70 per cent.

[1] Extract from weekly sanitary report, Field Hospital, First Provisional Brigade, U. S. M. C., Port au Prince, Haiti, Sept. 16, 1917.

SUPERNUMERARY LIMBS.

Reported by G. W. Baird, Rear Admiral, United States Navy, (Retired).

Filipino girl, aged 14, in good physical health and mentally bright. At birth the two supernumerary limbs were equal in development and function to the others. Now, from disuse, there is atrophy, but a certain amount of muscular control remains, the subject of the deformity being able to move the legs and to flex and extend the toes. The girl was on exhibition at Atlantic City, N. J., in August, 1917.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Medical Director E. R. STITT, United States Navy.
Medical Inspector C. N. FISKE, United States Navy.
Surgeon C. FOX, United States Public Health Service.
Surgeon F. M. BOGAN, United States Navy.
Surgeon H. F. STRINE, United States Navy.
Passed Assistant Surgeon G. B. TRIBLE, United States Navy.
Passed Assistant Surgeon R. W. McDOWELL, United States Navy.
Passed Assistant Surgeon G. F. CLARK, United States Navy.
Passed Assistant Surgeon J. C. PARHAM, United States Navy.
Assistant Surgeon J. E. HOUGHTON, United States Navy.

GENERAL MEDICINE.

DUDGEON, L. S., and CLARKE, C. **A contribution to the microscopical histology of malaria.** Lancet, London, August 4, 1917.

The authors note that these investigations were undertaken to ascertain the cause of death in some of the rapidly fatal cases of malaria occurring in the Saloniki forces in 1916. Particular interest arose from the frequency of cardiovascular phenomena in these cases.

In this epidemic of malaria sudden death was common, and a large proportion of the fatal cases died within 24 hours.

Heart.—In the microscopical examinations of sections of heart muscle fatty degeneration, of a type similar to that found in acute diphtheria, was encountered in six cases, the muscle cells showing fat chiefly in fine droplets, but also showing quite large droplets. In addition to the fatty degeneration, blocking of the capillaries with infected red cells was frequently noted.

From these findings the authors insist that the same care to protect the heart from undue exertion should be exercised in malaria as in diphtheria.

Adrenals.—Numerous changes were noted in the adrenals, but the most constant were loss of the characteristic lipoid substances of the cortex. The chromaffin substance in the medulla was also markedly reduced from the normal. Congestion of blood vessels was well marked, and where thrombosis of blood vessels occurred there was necrosis of both cortical and medullary portions of these glands. Hemorrhages were also present in the glands, showing marked con-

gestion. These changes in the adrenals may explain the frequently noted low-blood pressure of asthenic cases of malaria.

Central nervous system.—In sections of the central nervous system the vessels are engorged with blood and a large proportion of the red cells in the capillaries and arterioles show parasites in the form of rings or dots. The black pigment of malaria is seen and not the brownish yellow pigment of hemolysis. There is a complete absence of perivascular inflammation. The nerve cells show all stages of degeneration.

In this connection it is noted that the spinal fluid of 33 cases showed normal findings in 10 cases, while in 23 there was marked increase in the lymphocytes and an increase in protein content.

Spleen.—There was congestion in all cases, free hemorrhage in some, and in several instances necrosis of the splenic pulp was observed. They noted the striking necrosis of the malpighian bodies in a case of blackwater fever. In all the spleens the areas of necrosis showed black pigment. Pigment is present in abundance in most cases, and is found free in the mononuclear cells and the small giant cells of the sinuses. None of the cases showed any evidence of amyloid change.

Liver.—Pigment deposits were noted in every case. Necrosis of liver tissue in isolated areas is of common occurrence, similar to the focal necroses of other infections.

Kidneys.—Fatty degeneration of the renal epithelium, especially of that of the convoluted tubules, was noted in several cases. Thrombosed vessels associated with foci of necrosis were also noted in some cases. (E. R. S.)

EWART, W. **Diseases of the thorax and its viscera.** Progr. Med. September, 1917.

In a symposium on tuberculosis, edited by Dr. Ewart, a number of remarkable statements are made and at least one former "fact" is proven to be false.

Our efforts at prevention and cure have so far failed. It is emphasized that while practically all children are sooner or later infected, most of them are protected by a normal immunizing process, and only a few develop the disease.

Crofton believes that the only prevention for tuberculosis is preventive inoculation. Attention is called to the danger of dissemination by song birds. Tubercle bacilli in milk, if kept in a dark place, have retained their pathogenicity for 500 days.

Many writers speak of the failure of sanitaria to produce results commensurate with the money which has been and is being spent on them. The sanitarium treatment is unfavorably commented on in

editorials in the Lancet and the British Medical Journal, and the statement is made that the same amount expended for home treatment and rehousing would produce infinitely better results.

Newton believes that everyone should be tested with tuberculin in early life, just as cattle are. Those who react should receive injections twice weekly, beginning with infinitesimal doses, to establish an immunity as soon as possible.

The use of X-rays for diagnosis is emphasized, and the statement made that no case can be considered as having had a thorough examination until X-ray pictures have been taken and interpreted by one competent to do so.

Stapley says that fresh air does not cure tuberculosis and also that tuberculosis among cattle that have never been inside four walls is not uncommon in New Zealand. Besides if fresh air and sunshine cure tuberculosis it is a remarkable fact that tuberculosis has exterminated the aboriginal Tasmanian.

The reviewer is somewhat familiar with the conditions under which the natives of Tasmania, Australia, and New Zealand have lived since coming under the British rule. Instead of being outdoors they now live in houses which have little or no ventilation. As they receive pensions from the Government they are not forced to work and thus do not necessarily get exercise, fresh air, or sunshine. Many of them instead of using their pensions to purchase food spend it for intoxicants. These are the same sorts of conditions that are responsible for the frightful mortality from tuberculosis among the American Indians.

(F. M. B.)

SURGERY.

Wallace, C. A study of 1,200 cases of gunshot wounds of the abdomen. Brit. Jour. Surg., April, 1917.

In discussing gunshot wounds of the urinary bladder the author states that this organ was perforated 45 times in 965 operated cases. In 25 instances it was the only organ injured. The small intestine is the organ most frequently wounded in association. It is rather remarkable how seldom the pelvic colon or rectum is perforated at the *same time*. The pelvis is fractured in a large proportion of the ses.

These wounds of the bladder may be intraperitoneal, or extraeritoneal, or both. The intraperitoneal lesions—perforations, tears, slits—are very often not extensive and are as a rule easily sutured, cept those which occur at the very bottom of Douglas's pouch. he bladder should be explored for a foreign body. Suprapubic ainage is not necessary here—catheterization for a few days may

be necessary, or a catheter may be tied in, though this treatment is not to be continued for long. The extraperitoneal wounds, often accompanied by much hematoma, are slits or tears. They are situated on the sides of the bladder and are often caused by bony spicules. These wounds are treated by an incision down to the wound in the bladder, which latter may be sutured, if possible, and a drain left in the space formed by the operation. If the wound in the bladder can not be sutured it is most probable that a drain down to the wound will be sufficient; if there is any doubt a suprapubic cystotomy is most probably the safest course.

The uncomplicated bladder wounds show a mortality of 56 per cent. Shock and hemorrhage form the causes of death in the majority. Fracture of the pelvis seems greatly to increase the shock, and wounds of the pelvic vein seem responsible for a great deal of the hemorrhage.

In the case of complicated injuries the picture is dismal in the extreme. Most of these cases are intraperitoneal wounds, which in civil practice and when uncomplicated are not greatly feared. It would appear that the increase in time necessary to repair the bladder, after other serious injuries have been dealt with, is able to turn the balance against the patient, for the mortality is much worse than in intestinal injuries alone. (H. F. S.)

KAZANJIAN, V. H., and BURROWS, H. **Gunshot wounds of face and jaws.** Brit. Jour. Surg., July, 1917.

In discussing the anæsthesia for surgical intervention in these cases the authors say:

General anæsthesia.—The main precautions to be observed are two: (1) The avoidance of inhalation of septic material from the mouth into the respiratory passages, and (2) the provision of a perfectly free airway for the patient, so that there will be no violent efforts to breathe and no unnecessary engorgement of the veins of the neck to increase the length and difficulty of the operation.

To obtain the former end, the patient's mouth should be thoroughly cleaned and irrigated with antiseptic solution immediately prior to the administration. One hour before the operation a hundredth of a grain of atropine is given hypodermically to lessen the flow of saliva.

Anæsthesia is induced in the ordinary way until the patient is unconscious. The administration is then continued through two rubber tubes passed through the nostrils into the pharynx. The mouth is now thoroughly packed with gauze. By this means a free airway is insured, while the inhalation of blood and other material from the mouth is prevented. Sometimes it may happen that the

nostrils are too small to admit tubes of a sufficiently large size. One may then use an artificial airway inserted into the pharynx through the mouth, which is then packed off with guaze around it.

During the preliminary stages of anæsthesia the patient—supposing him to have a double fracture—may be unable to breathe freely unless the head and shoulders are supported. This difficulty will not grow less as the depth of the anæsthesia increases, and unless the cause and its remedy are known very serious trouble may arise from impeded respiration. The cause is the displacement of the tongue and the anterior portion of the jaw, and the point to be realized is that the tongue must be pulled forward and the jaw also. If the jaw only, or the tongue only, be pulled forward, there may be no relief; the traction must be on both. Failing immediate relief from this measure, the patient's head and shoulders must be well raised, when he will usually recommence to breathe. If not, tracheotomy should be performed without delay.

HILL, R. **Posture in cases of abdominal drainage.** Ann. Surg., October, 1917.

The author invites attention to the importance of posture for drainage after operations for septic abdominal conditions and to the excellent results obtained from the prone and lateral positions in 57 cases. The three definitely recognized positions in use are, first, the Fowler position; second, the prone or ventral decubitus; third, the lateral, in which the patient is placed on his side.

The Fowler method allows fluids to gravitate into the pelvis, from which they escape by means of a drain in the cul-de-sac of Douglas. The objections to this method are that the patient must be raised to such an angle to permit free drainage into the pelvis that a strain is thrown on the heart, gastric distention is increased, and the escape of pus takes place by siphonage. In 47 cases thus treated there were five deaths.

In the prone position maximum effects of gravity, intra-abdominal pressure, and capillary attraction are secured. The patient lies on his abdomen with a pillow under his head and another beneath his chest. The head of the bed is elevated 10 to 12 inches. The pus is brought against an area of the abdomen where blood vessels and lymphatics are not so numerous, absorption is very slow, and there are no spaces in the anterior part of the abdomen to favor the formation of pus pockets. In a series of 42 cases treated in this posture for drainage there were but two deaths.

In the lateral position the patient is placed on his right side, with a pillow under the region of the liver and the head of the bed slightly elevated. He is turned so that the pus will drain from in

front of the left kidney. In 15 cases treated in this manner there were no deaths.

The material found to be most satisfactory for drainage is a large slit rubber tube, with a small wick in it, with one or two additional drains of rubber dam wrapped around wicks of gauze after the plan of Morris. In summing up his paper Hill says that next to posture the most important factor in abdominal drainage is the aftertreatment, in which peristalsis is controlled by opiates, and absolutely no food is given by the mouth. A 3 per cent solution of glucose with 2 per cent sodium citrate is given by the Murphy method. This keeps up the strength of the patient and combats the tendency to acidosis. He advocates the strict application of the Ochsner treatment, in order "to secure the best results in these very interesting and but too often desperate cases." (R. W. M'D.)

WILDEY, A. G. **Ununited fractures treated by Long—Axial drilling of the fractured bone ends.** Brit. Jour. Surg., January, 1915.

The author in doing a second operation for nonunion in bone found that the periosteum had not produced any callus. He was already convinced that periosteum was of very secondary importance in osteogenesis. He reasoned that if the periosteum does not produce callus, then the new bone can only come from living old bone. He further reasoned that since osteoblasts can not travel unless a free channel is provided for them, that such a channel is demanded in cases of nonunion with hardened or eburnated fragment ends.

The operation consists in exposing and cleansing the ends of the fragments, refreshing them by removing the thinnest possible transverse section of bone that will insure a complete removal of all dense fibrous tissue, and drilling in the long axis of the shaft several channels in the indurated bone ends. The effect of this maneuver is a production of an artificial porosity of the osseous tissue.

The drill is made to penetrate to healthy bone. At the same time the medullary cavity, which may be found occluded, is made patent by longitudinal perforations. Apposition and immobility of the fragments are secured by plates or other mechanical means other than by the use of wire, to which the author is opposed.

Four or five drill holes are made, using a No. 1, 2, or 3 drill. The hole is from 1 to 2 inches deep or until healthy bone is reached, which is announced by the lessened resistance to the drill and the flow of blood. The deeper the hole the greater in number and the larger in diameter they ought to be.

In every case rapid union has occurred. Perhaps the only fault has been the formation of rather an excess of callus, but this has always produced a strong leg, fit for arduous service duties.

(J. C. P.)

HYGIENE AND SANITATION.

Rho, F. Compulsory antityphoid inoculation in the Italian Navy. Report to Acamedy of Medicine, Rome, November, 1916.

Mortality from typhoid fever in the civilian population of Italy has been reduced 50 per cent between 1888 and 1908. There has been also during this period a marked decrease of typhoid fever in the army and navy, where the disease was, of course, less prevalent. The following table shows mortality per 1,000 of strength:

Year.	Army.	Navy.	Year.	Army.	Navy.
1891	1.41	0.38	1900	1.06	0.36
1892	1.26	.44	1901	.76	.37
1893	.85	.23	1902	.78	.27
1894	.84	.40	1903	.66	.58
1895	1.15	.40	1904	.93	.35
1896	1.10	.42	1905	.98	.41
1897	.98	.18	1906	.83	.36
1898	1.22	.48	1907	.49	.60
1899	.97	.69	1908	.62	.47

Antityphoid inoculations became compulsory in the Italian Navy in February, 1915.

Cases of typhoid fever treated in naval hospitals, February, 1915, to July, 1916, civilian as well as naval personnel.

Hospitals.	Cases of typhoid (Eberth).	Cases of paratyphoid.	Cases of paratyphoid. A.	Cases of paratyphoid. B.	Total.
Spezia	12	4	.....	5	21
Napoli	11	2	2	2	17
Venezia	10	4	.....	.....	14
Taranto	14	.....	5	7	26
Maddalena	9	.....	.....	.....	9
Castellammare	5	1	.....	.....	6
Brindisi	7	10	.....	.....	17
Total	68	21	7	14	110

Year.	Strength.	Cases of typhoid fever.	Incidence per 1,000 of strength.
Before vaccination:			
1907	28,904	128	4.52
1908	29,415	146	4.96
1909	31,117	97	3.11
1910	31,661	118	3.72
12 months after compulsory vaccination:			
1915-16	70,000	64	.91

In view of the large proportion of paratyphoid infections, Castellani has employed with success a triple vaccine, a combination of Eberth, paratyphoid A, and paratyphoid B. The protection conferred is supposed to last only 28 months. The question of revaccination is an important one.

EDDY, W. H., and ROPER, J. C. **The use of pancreatic vitamin in cases of marasmus.** Am. Jour. of Dis. Child., September, 1917.

Vitamin was first isolated from rice polishings in 1911 by Funk and proved by him to be the agent which prevented beriberi as well as being an essential factor in growth stimulation. The same year Mendel and Osborne fed single purified proteins to white rats and showed that in addition to nutrients the diet of a growing rat, for proper development, required certain substances hitherto unknown, and which they found present in protein free milk and in centrifuged butter fat.

According to McCollum, a growing animal demands in his diet:

1. The presence of a "fat soluble" (his name for Mendel's butter fat factor).

2. The presence of a "water soluble" (his name for Funk's vitamin).

3. The absence of any toxic factors.

Hess has demonstrated that however much scurvy may resemble beriberi the yeast vitamin that curbs the latter does not control the former, and the orange juice that cures scurvy is not a growth stimulant and in that sense at least is not a vitamin.

All attempts to purify or to isolate vitamin in even an approximately pure form have failed. Another difficulty in the study of vitamins lies in the lack of any chemical test for their presence.

One advance in vitamin therapy has been the development of a special form of fuller's earth which when shaken with an aqueous pancreatic vitamin solution has the power to absorb the vitamin which can then be administered in concentrated form.

In addition to experimental work on rats the authors report the cases of 10 infants suffering from malnutrition who before receiving vitamin had long periods of treatment in hospitals, on various diets, and either became worse or showed no improvement. After vitamin treatment was started a marked improvement in growth and weight took place. Also its use ultimately resulted in the ability of the individual to utilize the natural vitamins present in foods.

The authors' conclusions are:

1. A diet of condensed milk and cereal is markedly deficient in natural vitamins.

2. The addition of pancreatic vitamins to such a diet influences the growth of both rats and infants.

3. The treatment produced no harmful effects.

4. The use of pancreatic vitamin seems to promise definite hope of success as an agent for stimulating the growth of marasmic children.

(F. M. B.)

TROPICAL MEDICINE.

CASTELLANI, A. **Notes on tropical diseases met with in the Adriatic-Balkans zone.** Jour. Trop. Med., July 16, August 1, August 15, September 1, and September 15, 1917.

The author notes that his statements represent his clinical experience in Servia, Macedonia, and other parts of the Balkanic zone during the past two years. The diseases are separately considered.

Malaria.—The number of cases of this disease has been appalling and pernicious types quite common. Reference is made to the current idea that malaria is not a very dangerous disease, and that its cure is a simple matter. The experience in the Balkans has shown what a terrible scourge malaria can be. The disease has shown itself largely in atypical form, simulating widely different pathological conditions. Of these are noted:

(1) Hemorrhagic types closely resembling scurvy, in which the patients were pale, showing numerous petechiæ and tense indurated swellings. Such cases at times showed spongy bleeding gums and hemorrhages from stomach and intestines. This malarial purpura rapidly responded to quinin.

(2) A pernicious anemia type with typical pallor and lemon-yellow tint, with only slight fever. The blood gives the picture of a pernicious anemia. The author notes that he has seen several cases of this type.

(3) Diseases of the nervous system. The author has encountered several cases of malarial polyneuritis. Some of these have simulated wet beriberi. One of his cases of malarial polyneuritis showed a Korsakov's psychosis. The comatose type of pernicious malaria was quite common. Some of these cases failed to show the usual high temperature and with contracted pupils may resemble opium poisoning. It is important to remember that a comatose type may develop quite suddenly in an old malarial patient in temperate zones.

The delirious type of cerebral malaria was noted in several cases and caused occasional confusion with delirium tremens. The author notes that the syndrome of cerebro-spinal meningitis may appear in these malarial affections of the central nervous system. Spinal types were rare, but one case was clinically a typical transverse myelitis.

(4) Specific infectious types. The disease which malaria most often simulates is typhoid fever, and the author notes that 90 per cent of the cases diagnosed as typhoid fever, in 1915, in Servia were malignant tertian infections. In such cases there was a slow onset, apathetic state, more or less continuous temperature, and palpable spleen. Such cases showed numerous ring form parasites and did not respond well to quinin.

Malta fever types were rare, but occasionally noted. Cases somewhat resembling Weil's disease were rarely noted as were cases of malarial jaundice resembling a simple catarrhal jaundice. Even cases suggesting tetanus, hydrophobia, and sleeping sickness may be malarial.

(5) Alimentary tract disorder types. In the dysenteric types of malaria the stool may contain blood and muco-pus or it may be almost purely hemorrhagic with only slight mucus content. Cases somewhat suggesting cholera were seen at Saloniki. One case was observed with a hemorrhagic pancreatitis syndrome.

(6) Respiratory and circulatory system types. The author has noted cases of dry bronchitis and dry pleurisy of malarial origin as well as two cases resembling lobar pneumonia. Of circulatory system types he has noted three cases resembling angina pectoris, as well as cases of cardiac arrythmia and one case of 3:1 heart block.

(7) Skin eruptions. Apart from herpes, skin eruptions were rare. He did note, however, cases of urticaria, scarlatiniform erythema, and one case each showing the picture of erythema multiforme and erythema nodosum. Pigmentations were met with rather commonly, and occasionally the syndrome of Addison's disease may be seen.

In treatment of malaria the author notes the necessity for intramuscular injections in serious cases and intravenous ones in pernicious cases.

While arsenic or other qunin substitutes have not shown value in his hands, yet an association or alternation of such drugs with quinin is often useful.

Where quinin is given for prophylactic purposes the daily dose in the Balkans should be 10 grains instead of the customary 5.

Typhus Exanthematicus.—These cases often show a marked flushing of the face, neck, and upper chest, with a subcuticular mottling of the lower chest and abdomen. This is far from specific as it is almost constant in the Pappataci fever cases. The true rash of typhus fever appears on the fourth or fifth day as spots on the abdomen similar to the spots of typhoid. These spots extend to chest, but rarely go to arms and legs. These spots may become darker and cease to fade on pressure, but seldom become as dark as the spots of a purpuric condition.

One must be on guard to prevent mistaking the insect bites, so common in the Balkans, for typhus spots in cases with fever. These flea or lice bites show a central hemorrhagic spot.

While the disease generally begins suddenly, yet, cases with a typhoidlike onset are far from rare.

In 80 per cent of cases the fever comes down rather by lysis than crisis, as is usually stated in text books.

The most frequent complications were parotitis, gangrene of the feet, polyarthritis, and neuritis.

As regards lice prophylaxis naphthalene was best suited for the clothing of troops. Although with less insecticide power than kerosene oil, iodoform, and anise preparations, it is preferable from lack of odor. For the better classes he prefers a menthol powder (menthol, gr. iii to v; zinc oxid, oz. i). This is repellant to mosquitoes as well as to fleas and lice, and tends to prevent prickly heat.

Relapsing Fever.—This was extremely common in 1915 and not rare in 1916. It was not infrequently associated with typhus and malaria.

The frequent association of typhus and relapsing fever is explainable by their transmission by the same insect, the louse. Castellani believes that the bedbug also carries relapsing fever. He notes the extreme difficulty of differentiating clinically typhus, relapsing fever, and Pappataci fever in the early period of these diseases.

While the microscope will usually clear up the diagnosis there are many cases where spirochaetes are rare. In treatment he has had excellent results with salvarsan and galyl, but thinks a combined treatment with tartar emetic more successful. He uses 4.8 c. c. of a 2 per cent solution of tartar emetic intravenously or the following: Tartar emetic, 4 grams; sol. ac. carbol 1 per cent, 100 c. c. One-half to 2 cubic centimeters of this solution is diluted to 5 c. c. with sterile saline.

Pappataci Fever.—This fever is extremely common all over the Balkans in summer. It is usually stated that *Phlebotomus papatasii* only bites in darkness, but he can confirm Hugo's statement that it will also bite during the day.

The disease, but for the rash, is entirely similar to the dengue one sees in the Orient. The face is flushed and swollen, the conjunctivae are injected, and there are rheumatoid pains, with headache and pains in the eyeballs.

The fever keeps high for about two days and then drops by crisis on the third day. It is very difficult to differentiate the early period of typhus fever from this disease, but the presence of a leucopenia in phlebotomus fever and a tendency to leucocytosis in typhus is differentiating.

Dengue.—Castellani notes that the cases seen in the Balkans are Pappataci fever and not dengue. Dengue, however, was present in Gallipoli. He makes some interesting remarks about dengue, one being that he has generally found enlargement of the superficial lymphatic glands, particularly of the cervical gland, but also of the axillary and inguinal ones. The gland juice from such glands has reproduced dengue when injected in two out of three cases.

He considers that immunity is not a feature of dengue as he has known people to have attacks in three successive years.

Typhoid and the Paratyphoid Fevers.—The author notes that typhoid is common in the Balkans, but not so common as paratyphoid A and paratyphoid B. He has seen mixed infections of these diseases and has even observed two cases of infection with all three diseases. The combined vaccines, first suggested by Castellani several years ago, have given good prophylactic results in the Army.

Camp jaundice.—Castellani divides these affections in two groups (1) a severe type or Weil's disease, which is rare, and (2) a mild type, which is common.

In the severe type the onset is abrupt with high fever and shiverings. The spleen and liver are often enlarged. Jaundice appears two or three days after the onset. Hemorrhages are common and petechiæ often present. The temperature drops by crisis or rapid lysis from the eighth to the twelfth day. There is often a short relapse. The prognosis is serious and the treatment unsatisfactory.

The mild form of camp jaundice is common. This may show a prolonged prejaundice stage in which malaise and rheumatoid pains are prominent, with but slight temperature rise. At this time the urine contains bile pigments. In the jaundice stage the patient is markedly prostrated, but has little or no pruritus. The jaundice stage may last for from two to eight weeks. Castellani believes both these types of camp jaundice to be of spirochætic origin.

Dysenteries.—Bacillary dysenteries are extremely common in the Balkans. He has seen a type which clinically resembles cholera, the stools being serous with only now and then a tinge of blood.

As to treatment he warns against giving astringents at the beginning. This should start with magnesium sulphate, 2 drams every 2 hours for from 24 to 48 hours. Then astringents may be used. He notes that polyvalent sera are on the whole efficacious.

Polyarthritis and parotitis are complications which may occur, and in the polyarthritis of bacillary dysentery salicylates are of no value.

Flagellate diarrheas.—Flagellate diarrhea is far from rare in the Balkans. The flagellates most frequently found are *Lamblia intestinalis*, *Trichomonas hominis*, *Cercomonas hominis*, and *Tetramitus mesnili*. In three cases the author has found *Provazekia asiatica* as cause.

It is probable that where flagellates are present in small numbers they give rise to no symptoms. *Lamblia* seems to have a more distinct pathogenic action than the others.

In treatment of this condition Castellani still recommends methylene blue. For the first two or three days he gives aperients (sodium sulphate) followed by 1 to 3 grains of the drug, t. i. d. The drug

must be absolutely pure, free from arsenic. He often combines the drug with 5 grains of salol. Besides oral administration he recommends intestinal irrigation with 1 to 5,000 or 1 to 3,000 methylene blue.

Bronchial spirochætosis.—This condition is not rare in the Balkans. Castellani distinguishes three types—the acute, the subacute, and the chronic type.

In the acute type the patient has a temperature rarely exceeding 103 F., coughs a great deal, expectorating a scanty muco-purulent secretion, and has rheumatoid pains all over the body.

In the chronic types the temperature may be normal or somewhat hectic. There is cough and expectoration of muco-purulent material. This type may suggest tuberculosis.

The diagnosis is based on the finding of spirochætes in the sputum. Bronchomycoses are also met with in the Balkans. (E. R. S.)

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

MORISHIMA, K., and TEAGUE, O. **The isolation of typhoid bacilli from urine.** Jour. Infect. Dis., August, 1917.

The writers found that eosin brilliant-green agar gave the most satisfactory results for plating urine.

"The medium is prepared as follows: 1 pound of chopped beef is soaked in 1,000 c. c. of distilled water in the ice box overnight. The fluid is squeezed through cheese cloth, heated, and passed through filter paper. To the filtrate are added agar (1.5 per cent), Witte's peptone (1 per cent), and chemically pure sodium chlorid (0.25 per cent). This mixture is heated in the autoclave at 15 pounds pressure for 20 minutes. The reaction is brought to 1 (hot titration) and the medium is cleared with egg white and filtered through cotton. It is then placed in flasks in amounts of 200 c. c., sterilized in the autoclave, and stored for use. To 50 c. c. of the agar are added ½ gram lactose, 1 c. c. of 3 per cent eosin solution, and 1 c. c. of 0.2 per cent brilliant-green solution. The agar is shaken and poured into Petri dishes."

Comparison was made between plating the urine directly and after enrichment by incubation overnight with broth, 3 per cent dextrose, and with salt solution. Broth was found to be most satisfactory for enrichment.

The method finally adopted was to plate directly from the urine upon eosin brilliant-green agar. Another portion of the urine was used for enrichment—1 part of broth, reaction +1, to approximately 5 parts urine. If typhoid organisms were not found by the following

morning from the plates prepared directly with urine, dilutions from the incubated urine and broth were made $\frac{1}{10}$, $\frac{1}{100}$, and $\frac{1}{1.000.000}$.

A loop from dilutions of $\frac{1}{1.000.000}$, $\frac{1}{10.000}$, and $\frac{1}{100}$ was plated onto the eosin brilliant-green agar, one plate for each dilution. The loopful was spread over the entire surface of the plate, going from one area to another to insure proper distribution. (G. F. C.)

SMEETON, M. A. **Comparison between the subcutaneous and intracutaneous methods of testing the virulence of diphtheria bacilli.** Jour. Infect. Dis., September, 1917.

The usual methods of determining virulence by subcutaneous injections with the modifications by Neisser and by Zingher, who used intracutaneous injections, are discussed.

Comparison of the subcutaneous and the intracutaneous methods, using 37 organisms from throats of positive or suspected cases, was done. Twenty-two of the 37 cultures gave identical results by both methods—14 were virulent and 8 nonvirulent.

Because of an infectious disease among the animals 15 of the tests were repeated. A possibility of error by the subcutaneous method was noted in three cases, as the test animal died and the corresponding control lived, death being due to infectious disease.

The intracutaneous test used was the modification by Zingher and was performed as follows:

"Two guinea pigs are used for testing 4–6 strains. The hair on the abdominal surface is removed and four or six areas are marked according to the size of the pig. One pig serves as a control and receives about 100 units of antitoxin intracardially at the time of making the tests, or intraperitoneally 24 hours before. A bacterial suspension is made from a fresh 24-hour growth from an ordinary Loeffler's slant suspended in 20 c. c. of physiologic sodium chlorid solution; 0.15 of this emulsion is injected intracutaneously into both pigs. A very fine steel or platinum iridium needle should be used. If the injection is properly made, a circumscribed elevation appears which persists one or two minutes. Virulent strains induce a definite local inflammatory lesion which shows a superficial necrosis in 48–72 hours. In the control pig the skin remains normal. With nonvirulent strains no lesion will be found in either control or test animals.

"For the subcutaneous tests, the organisms were grown in meat infusion broth (neutral to phenolphthalein), to which 10 per cent horse serum was added. After an incubation period of 48 hours, 2 c. c. of this toxin culture were injected into a test pig. A control pig received the same amount of culture and at the same time 100 units of antitoxin.

"Variations in the susceptibility of the different animals used appeared to influence the results in a small degree. In two instances

the test pigs inoculated subcutaneously did not react, while the test pigs inoculated intracutaneously showed marked necrosis. A repetition of the tests gave conclusive evidence that the organisms injected were virulent and that the failure to produce death was in all probability due to a certain amount of natural antitoxin possessed by the individual guinea pigs.

"In the other instance the first test pig injected intracutaneously was apparently insusceptible.

"From the number of cultures tested, the intracutaneous appears to give more accurate results than the subcutaneous method and has a further advantage of being more economical in time and animals. A possible disadvantage lies in the fact that if one toxin pig dies, four or six tests must be repeated." (G. F. C.)

Dochez, A. R., and Avery, O. T. The elaboration of specific soluble substance by pneumococcus during growth. J. Exper. M., Balt., 1917, xxvi, 4, 477–493.

The writers here show that the pneumococcus, during the early stages of its growth, forms a readily soluble substance which diffuses into the culture medium in vitro, and in human and animal infections is present in the circulating blood, whence it passes through the kidneys into the urine. Type III forms a large amount of the soluble substance, II and I less, in the order named. The soluble substance is demonstrated in bacterium-free bouillion and in the serum and urine of rabbits infected with pneumococcus.

A series of precipitin tests on urine of cases of lobar pneumonia and closely related respiratory diseases resulted in 62.5 per cent positive reactions, the substance secreted reacting with the type of serum corresponding to the organism with which the individual is infected. No positives were obtained from patients with other respiratory diseases. The amount of the precipitable substance seems to be of prognostic import, as cases failing to show the reaction generally recovered while those showing large amounts excreted gave a high mortality. The specific precipitin test would seem to be of use in the early diagnosis of type, the authors having proved this test to be quite as reliable as the agglutination of the organism isolated from the sputum. However, they do not believe this test should supplant the usual diagnostic technique in determination of pneumococcus type.

The soluble substance is identified as a protein which is not destroyed by boiling, precipitation with alcohol, acetone or ether, or by trypsin digestion. The toxicity has not been determined, no definite answer being given, but the writers suggest that "it possesses a degree of toxicity which, exhibited throughout the course of an infection, may account for the signs of intoxication on lobar pneumonia."

(J. B. H.)

AVERY O. T.; CHICKERING, H. T.; COLE, R. C.; and DOCHEZ, A. R. **Acute Lobar Pneumonia, Prevention and Serum Treatment.** Monographs of the Rockefeller Institute for Medical Research, No. 7, October 16, 1917.

The pneumococcus is typically a lance-shaped diplococcus. It is nonmotile, nonflagellated, and does not form spores. It is bile soluble, possesses a capsule, is gram positive, ferments inulin, is extremely pathogenic for mice, and on blood agar forms a small, moist, flat, ringed, checkerlike colony with a greenish zone of methemoglobin about it.

The various types react specifically with their homologous immune sera. The capsule surrounding the organisms is most pronounced in Type III or pneumococcus mucosus as it is called. Pneumococci grow equally well under aerobic and anaerobic conditions. The thermal death point is 52 C. for 10 minutes. The optimum temperature for cultivation is 37 C., the limits of temperature being 25 to 41 C. As a rule pneumococci isolated from the blood of pneumonia patients are of such virulence that .000001 c. c. of broth culture kills white mice in 36 hours. However, strains may be recovered which possess only moderate virulence.

Four principal types of the pneumococcus have been isolated, called, respectively, Type I, Type II, Type III, and Type IV. The authors' studies show that Type I and Type II are responsible for the largest number of cases of pneumonia (64%), with 57% mortality: that Type III, while only responsible for 12% of the cases studied, is associated with the greatest mortality (100%). Serum prepared from Type I is highly efficacious in the treatment of pneumonia due to Type I. That prepared from Type II is much less efficacious. In their words, "Indeed it has not yet been thoroughly demonstrated whether it has any practical effect on the outcome of the disease or not." Serum prepared from Type III has only a slight therapeutic value, while no serum of any value has been prepared from Type IV.

The etiological diagnosis is important because identification of the type is of value in prognosis and because treatment with serum is only applicable in Type I.

Media should be prepared from fresh meat, and not from beef extract. The reaction of the media should be from 0.3 to 0.5 acid to phenolphthalein. Sterilization should be accomplished by the Arnold method for 20 minutes on three successive days. Media should not be autoclaved. The media and stains required are nutrient broth and agar, blood agar, serum water media for fermentation test (this medium contains beef serum, litmus solution, and inulin), sterile bile, Gram's stain and a capsule stain. Full directions for preparing the media and stains are given in the article.

Sputum should be collected from the deeper air passages and sent to the laboratory at once. Direct smears should be made and stained by Gram, by Ziehl-Neelsen, and by Hiss capsule stain. A small portion is washed, centrifugalized, and inoculated intraperitoneally into a mouse. As soon as the mouse is killed or dies the peritoneal cavity is opened with sterile precautions and cultures are made from the exudate on one half of a blood agar plate, the other half of which is used to plate blood withdrawn from the heart of the animal. Films are also stained with the before-mentioned stains.

The exudate from the peritoneal cavity is washed out. When in pure culture the macroscopic agglutination test may be made direct

from this exudate after centrifugalization (the technique for the entire procedure of identification is fully described in the article).

For the agglutination test equal quantities (0.5 cc) dilutions of the immune serum and a suspension of the organisms are used. Results are determined after incubation for one hour at 37 C. To satisfactorily differentiate the types it has been found that in Type I a dilution of 1 to 20 should be used, in Type II a dilution of 1 to 20, and in Type III a dilution of 1 to 15.

By using Type II serum in a 1 to 20 dilution and also in undiluted form, certain subgroups of Type II may be differentiated. Where no agglutination takes place and the organism is bile soluble, it is classified as Type IV.

A specific precipitin reaction is also of value. This may be obtained from the urine.

Pneumococcus may be obtained from the blood of the patient in about 20% of cases. It may be said that the greater number of colonies obtained from one c. c. of blood the more likely the disease is to have a fatal termination.

A polyvalent serum is of no value. There is also some danger of producing an anaphylactic reaction. Determination of the type can ordinarily be made in from 6 to 18 hours. It is therefore best to make bacteriological tests of cases of pneumonia, and if found to be due to Type I to administer the serum prepared from that type. Before administering serum it is well to determine whether the patient is sensitive to horse serum by intradermal inoculation of .02 c. c. of sterile diluted horse serum (normal or immune). An injection of a like amount of sterile salt solution is made as control. If the patient shows a reaction, steps must be taken to desensitize.

Serum should be administered intraveneously. The initial dose should be about 90 to 100 c. c. and given every eight hours in doses of 90 to 100 c. c. until favorable results are obtained.

The average total amount of serum required in their cases was about 250 c. c. It must be given slowly and must be warmed slightly above body temperature. It is better to dilute with equal parts of sterile freshly distilled salt solution. Not less than 30 minutes should be taken to administer the serum. If untoward symptoms arise during the injections, stop and wait 15 or 20 minutes. An anaphylactic reaction is usually quickly relieved by a hypodermic injection of 0.6 c. c. of epinephrin 1 to 1,000 solution or 0.5 mg of atropine sulphate, or both.

It has been found that those pneumococci most commonly found in the mouth secretions of normal individuals belong to the types that give rise to a minority of the cases of pneumonia. Also, the disease produced by these organisms, except Type III, is less severe in character. Types I and II cause a majority of the cases of lobar pneumonia, are of high virulence, and are seldom found in the mouth secretions of normal individuals, unless such person has been in intimate association with a case of lobar pneumonia.

(C. F.)

CHEMISTRY AND PHARMACY.

Wimmer, C. P. The war and pharmacy. Am. Jour. Pharm., October, 1917.

The author reviews in an interesting way the situation of pharmaists in the European countries involved in the present war. A

careful review of German and Austrian publications reveals the existence of a serious lack of qualified assistants in drug stores. Almost every other advertisement for help asks for lady pharmacists. Female help is being employed in German pharmacies on an unprecedented scale. All chemicals which can be utilized by the Government have been seized. The market abounds with substitutes, many of them offered under proprietary or trade names and practically of no value. For example, a substitute salad oil proves on analysis to be a solution of gum in water, colored yellow with a coal-tar dye, and having a food value of only one two-hundred-and-fortieth of that of oil. In order to save lard or eatable fats various combinations are recommended as a base for liniments and ointments. These for the most part contain rape-seed oil, olein, ammonia water, lime water, and either lard, paraffin or liquid vaseline. It is claimed that they are readily miscible with chloroform. In place of tincture of iodin a 5 to 10 per cent solution of tannic acid in 95 per cent alcohol is recommended. Owing to the scarcity of soap the following preparation is widely used:

Quillaja bark, 100 grams, is heated with 300 mils of water in a steam bath for one-half hour. Filter and when cool add kaolin, 400 grams, and talcum, 400 grams. Flavor with 10 drops of benzaldehyd.

Another interesting preparation is vegetable milk. Experiments with the milk juices of almonds, hazelnuts, walnuts, and soya beans suggests that these milks have considerable value. Upon standing, a cream separates, which can be used in tea, coffee, or cocoa, and imparts the same taste as the cream of cow's milk.

The pharmacists of Russia are realizing their dependence upon German products, and new chemical and pharmaceutical societies are being organized with a view to stimulating manufacture of remedies formerly obtained from Germany. In Tomsk, for example, such preparations as urotropin, antifebrin, xeroform, etc., are now produced. There is a movement on foot to cultivate medicinal plants such as the castor bean.

The army council of the English Government has taken possession of all stocks on hand in a wholesale or retail business in excess of quinin sulfate, 100 ounces; quinin bisulfate, 25 ounces; quinin hydrochlorid, 25 ounces; phenacetin, 7 pounds; formaldehyd, 10 gallons.

Glycerin is no longer obtainable and substitutes are offered for it, depending upon the purpose for which it is to be used. As a softener for the skin, it is replaced by a mixture of equal parts of anhydrous eucerin and concentrated solution of calcium chlorid. In general, the substitutes for glycerin may be divided into four classes: (*a*) Solutions of salts, (*b*) solutions of sugar, (*c*) solutions of gums, (*d*) solutions of oils.

Owing to the great necessity for economy in sugar, physicians are requested not to prescribe sirups. There are more desirable flavors

than sweet, though these are most pleasing to infants. There are many cases where a sour preparation would be preferred, and in these fermentation would not occur. It is proposed to use malt extract in place of sugar. One gram of malt extract generally produces about 1 gram of sugar in a porridge or rice and milk pudding.

As one reads Dr. Wimmer's article and realizes in how many other branches of work the countries of Europe are increasing the habits of thrift already developed so far beyond anything that prevails in this country, the thought presents itself that there may be incidental benefits for us and many lessons from this war which could be acquired in no other way. If, in addition to accomplishing the main objects for which we are fighting, this country can learn to husband its resources and to employ them wisely, if communities, families, and single individuals can through the force of temporary necessity acquire those habits of thrift and economy so conspicuously lacking up till now, we shall have been paid and well paid for our service.

EYE, EAR, NOSE, AND THROAT.

PATON, L. **Functional spasm of accommodation.** Brit. J. Ophth., London, vol. 1, No. 10.

True spasm of accommodation is one of the rare conditions met with in ophthalmology. The term is frequently applied, however, to the partial contraction of the ciliary muscle found in some young hypermetropes, which may compensate, partly or fully, the amount of hypermetropia. This is not true accommodative spasm, but is a physiological adaptation in the interests of clear vision. A smaller degree of spasm of the ciliary muscle exists in a definite proportion of myopes, especially among uncorrected myopic school children. It may be only a phenomenon associated with increased convergence that uncorrected myopes and astigmatics adopt to get clearer vision.

True spasm may be defined as a sudden development in one or both eyes of a high degree of apparent myopia which disappears under the influence of atropin. This spasm may be either continuous or clonic, or may pass from clonic to a continuous condition and may be associated with spasm of other ocular muscles. Several cases were reported.

(G. B. T.)

FRANK, I. **Post-tonsillectomy lung abscess.** Laryngoscope, St. Louis, Vol. XXVII, No. 6.

Bassim in France in 1913 reported 19 cases of broncho-pulmonary complications following tonsillectomy, of which two were lung abscesses. At the Massachusetts General Hospital among 16 cases of

lung abscesses during a period of eight years "several followed tonsillectomies." Yankauer has mentioned four cases. Manges recently published a series of nine cases, six of which occurred during a period of six months at Mount Sinai Hospital. Records of the Michael Reese Hospital Library, covering a period of 10 years, show 37 diagnoses of lung abscesses made, of which three were made a short time after tonsil operation. The histories in all of these cases show a marked similarity. A circular letter to 50 internists, surgeons, and laryngologists gave information of 15 more cases.

The mechanism by which pulmonary abscess is produced during or following tonsillectomy is either by aspiration of blood or infected material or septic embolism. Anæsthesia, per se, can not be held responsible, for general anæsthesia used for operations remote from the nose and throat practically never produces lung complications more serious than pneumonia. Metastatic pulmonary infection can readily occur from the exposed and more or less injured blood vessels covering the outer walls of the pharynx and tonsil cavities, which are in a field which it is impossible to keep free from saliva and pus.

(G. B. T.)

DOWNEY, J. W., Jr. **The value of the complete examination of the ear in syphilis.** Am. J. Syph., Vol. I, No. 3.

Many investigations give evidence that the eighth nerve is more frequently attacked in all stages of syphilis than any other cranial nerve, and that the lesion is a true neuritis. The internal ear and eighth nerve have two separate and distinct functions—hearing and equilibration. The deafness due to a syphilitic acoustic neuritis may be very slight and the patient hear the voice well; the most characteristic hearing defect is a shortening of the duration of perception for a tuning fork by bone conduction out of all proportion to the shortening of duration of perception for the same fork when it is heard by air conduction. High-pitched forks are badly heard, but those of low pitch are relatively better by air conduction. Vertigo, nausea, vomiting, and spontaneous nystagmus are the principal symptoms indicating involvement of the static labyrinth, but in syphilis the last three are not common, and even vertigo may have to be elicited on questioning, when on examination it is found that the static labyrinth is completely dead. The Bárány tests of the static labyrinth give constant results in normal individuals. They depend upon overstimulation of the terminal nerve fibers in the ampullae of the semicircular canals and in the vestibule. This stimulation is produced by a movement of the endolymph set into action by rotating the individual in a smoothly revolving chair of special design, or by irrigation of the ears with water above or below body temperature.

The objective signs produced by this stimulation is a nystagmus, depending in character upon the set of canals which are stimulated, past pointing of the extremities, and falling of the body to one side or the other. Jones and his coworkers have succeeded in locating and tracing the neuraxial tracts of the vestibular of the eighth nerve. They teach that each semicircular canal has a nystagmic tract and a vertiginous tract, and the tests are particularly valuable in the localization of the cerebellar and brain stem lesions. At least it can be determined with a degree of certainty whether an eighth nerve involvement is intralabyrinthine in the nerve trunk or central. A clinical study of patients with syphilitic deafness by the Bárány methods, in the author's experience, has indicated lesions in all portions of the aural nervous apparatus. The most characteristic reaction of syphilitic vestibular disease is a lowering and a confusion of all the responses from the static labyrinth. This may vary from the totally dead labyrinth, giving no response, to cases showing normal responses, reduced in degree. Increased irritability of the static labyrinth, evidenced by prolonged nystagmus, with nausea and vomiting, is a sign which may not be overlooked. Crossed past pointing may be present. The pathology of these auditory cases is probably, first, a toxic irritation from an infected spinal fluid, which is followed by an involvement of the nerve tissue itself. The eighth nerve is devoid of neurilemma and its location makes it liable to attack.

(G. B. T.)

SPOHN, G. W. **A working knowledge of ophthalmology and oto-laryngology for the general physician.** Jour. Indiana Med. Assn., vol. 10, No. 7.

Since the generalist is obliged to treat eye and ear cases, he should have at least a gross knowledge of these subjects. It is better to do nothing than the wrong thing. There are three symptoms in eye diseases that should be remembered—congestion, including redness and edema, pain, and lachrymation. These may be produced by a foreign body, but its elimination should make one suspicious of conjunctivitis, because 30 per cent of all eye diseases are conjuctival. Conjunctivitis is due to infection, which can be verified by laboratory methods, or mechanical irritation, which, if removed, will cure the disease. In iritis there is a free flow of tears, pain in the eye and nple, redness around the cornea, while with conjunctivitis the redss is greatest away from the cornea. In glaucoma the cornea is æsthetic and hazy, the tension is increased, there is intense pain neuralgic nature, and sometimes nausea. The treatment of iritis d glaucoma is extremely important, as is any disease of the deeper uctures of the eye, and should be left to the ophthalmologist.

To avoid middle-ear diseases and deafness, physical defects should be corrected in childhood.

NOTE.—Discussion by Dr. E. M. Shanklin and Dr. William Posey brought out the fact that much damage is needlessly done by improper treatment in general practice when skilled advice is at hand, and cases are not treated or are improperly treated and prescribed for sometimes by optometrists, and are only referred when it is too late to save the sight or to make an early diagnosis of intracranial or other lesions giving eye symptoms.

(G. B. T.)

MILITARY, LEGAL AND INDUSTRIAL.

BALESTRA, D. **Statistics of the Italo-Austrian campaign.** Gior. di med. mil., Roma, LXV, III, March 31, 1917.

No account is taken of minor sickness or injury treated in field dressing stations or dispensaries, and figures refer to hospital cases proper.

Morbidity from commencement of military operations to December 31, 1915, 2.71 per 1,000 of strength; from January 1, 1916, to June 30, 1916, 1.57 per 1,000 of strength.

These figures are regarded as very gratifying, as calculations based on previous wars, especially those of more recent date, warranted provision for a morbidity of 4 per 1,000 in large units. While the favorable results are due in part to wise provisions in the matter of food, clothing, and trench and camp construction, the most important contributing factors lie in the general sanitary precautions taken and especially the various prophylactic measures employed.

Table showing percentage of admissions for various types of morbidity:

	First period.	Second period.
	Per 100.	*Per 100.*
Ordinary medical diseases	58.81	66.81
Ordinary surgical diseases	12.49	17.80
Epidemic or endemic diseases	7.57	3.59
Diseases of the eye	9.06	4.44
Venereal diseases	9.05	4.62
Scabies	3.02	2.74
Total	100.00	100.00

It is apparent from the above tables that all those maladies against which sanitary and prophylactic measures could be employed underwent a marked reduction in the second period, and the only increase evident was in the ordinary medical and surgical affections inseparable from the fatigue and exposure of campaigning.

War wounds and injuries.—A study of the losses sustained in the principal campaigns of previous wars, and more especially in the Russo-Japanese war, promised a basis for estimating the surgical provisions necessary for modern war, but it soon became evident that any conclusions drawn from the past must fall far short of the facts in the present war. This is due in large measure to the extensive use of high-caliber artillery and of various forms of explosive bombs, the latter favoring severe wounds and complicating sepsis. In spite of this, however, the percentage of losses has been much less than might have been imagined.

The actual losses for the average number actively participating in battle have been: First period, 7.13 per 100; second period, 5.06 per 100.

These figures are not high when one considers that the average loss for large units, such as whole armies, were estimated at 10 or 15 per cent. Fischer, whose forecasts were regarded as particularly trustworthy, estimated that the total losses in the large armies engaged would reach 22.5 per cent. The low percentage of wounded, considering the numbers engaged, is to be explained by the nature of the fighting in the present war, where combat in the open has been rare compared with trench warfare.

Table showing the percentage of wounds due to various types of weapon, hand grenades, and bombs being included with shell wounds:

	First period.	Second period.
	Per 100.	*Per 100.*
Shell wounds	46.91	54.84
Wounds from small arms	52.60	39.16
Wounds from sword, bayonets, etc.	.36	.59
Effects of asphyxiating gases	.13	5.61

It is interesting to compare this with the figures for the Russo-Japanese War:

	Per cent.
Wounds from small arms	80
Wounds from artillery	15
Wounds from sword, bayonet, etc	5

Here the proportion of bullet to shell wounds is 5.33 to 1, whereas in our Army in the present war the percentages are almost the same for the first period, and for the second period shell wounds are to rifle wounds as 1.4 is to 1. There has therefore been an increase in the relative losses from artillery fire, and the very latest figures furnished by the Surgeon General of one of our Army Corps show a proportion of 3 to 1 in that body.

While there was a conspicuous increase in the losses from asphyxiating gases in the second period, due to their extensive employment by the enemy, it can be positively affirmed that owing to efficacious and important measures adopted by our forces for both collective and individual protection the losses from this cause will steadily decrease, no matter to what extent the enemy may employ it hereafter.

It is easy to understand why from the nature of the fighting the percentage of wounds from cutting and stabbing arms is low.

The following tables classify wounds by their severity and by locality:

TABLE A.

	First period.	Second period.
	Per 100.	*Per 100.*
Severely wounded	31.60	23.62
Slightly wounded	55.38	63.01
Trivial wounds permitting immediate return to formation	13.02	13.37

TABLE B.

	First period.	Second period.
	Per 100.	*Per 100.*
Wounds of head and neck	13.40	21.92
Wounds of thorax	10.95	12.83
Wounds of abdomen and pelvis	6.35	8.80
Wounds of upper limbs	34.80	27.52
Wounds of lower limbs	29.50	28.92

In A and B we see the high percentage of serious wounds and in a corresponding way the frequency of wounds of head, abdomen, pelvis, regions whose involvement is usually synonymous with grave danger.

The figures for trivial wounds are practically identical for the two periods, but those for wounds of the limbs are astonishing. Wounds of both upper and lower limbs are fewer in the second period, but in their percentage importance have changed places.

Mortality.—It is of interest to inquire into the proportion of dead to wounded, and a distinction must be made between wounds immediately fatal and those from which death follows after a distinct interval of time. Wounds that are immediately fatal have usually involved the large vessels, the intra-abdominal or intrathoracic organs, or the skull contents. Wounds which are not immediately fatal depend for their outcome on a variety of circumstances, such as primary or secondary infections, and the opportunities for treatment afforded by field hospital service. The following table shows

the proportion of wounds immediately fatal to wounds where death followed at a later period:

	First period.	Second period.
	Per 100.	*Per 100.*
Deaths on the field	5.47	7.87
Deaths in field hospitals, etc., following wounds	11.24	10.16

These figures would seem to show a somewhat lower percentage for this war than for previous ones. The mortality secondary to wounds was estimated at 16 per cent of wounds in the Japanese Army during the Russo-Japanese War; the average in the War of Secession in the United States was 14 per cent; in the Boer War, 5 per cent. When we consider the organization of medical service and the improvement in surgical technique and the remarkable progress through aseptic and antiseptic methods we would expect to have a better showing than this. We have to remember, however, that on account of the preponderance of shell wounds serious complications are much increased, and the real wonder is that death following injuries of this kind is not more frequent than it is.

In discussing this question of mortality it was interesting to investigate the relative proportion of officers and men killed. In the present war we find that one officer was killed for each 29.8 of the men during the first period, and one officer for each 27 men killed during the second period. While these figures are somewhat lower than the average obtained from previous wars, namely, one officer to 25 men, we must except our own campaign in Africa, during which the losses of officers and men were in the proportion of 1 to 15. It might appear at first blush that the universal adoption by officers of campaign uniforms had something to do with their better mortality rate, but this explanation can not hold in view of the fact that it was precisely during the second period reported upon that the change in uniform had become generally enforced and adopted. There are therefore other factors to be investigated in order to clarify this point, and they probably depend on the conditions which prevail at the moment of actual battle.

.ws relating to venereal d'sease. Weekly Bulletin of the Department of Health, City of New York, June 2, 1917.

At the recent session of the State legislature two excellent laws ere placed on the statute books, laws which should prove of imense influence in bringing about a more effective administrative ntrol of venereal diseases.

One of these constitutes an amendment to the domestic relations law and requires all persons applying for a marriage license to take the following oath:

I have not to my knowledge been infected with any venereal disease, or if I have been so infected within five years I have had a laboratory test within that period which shows that I am now free from infection from any such disease.

It is true that conjugal venereal infection is often due to disease contracted by one of the parties subsequent to marriage, and that the provision quoted above will therefore be without influence on all such cases. Moreover, the mere taking of the oath will not make absolutely certain that both parties are free from infection at the time of marriage. Nevertheless the new law should exert an important educational influence on a hitherto much tabooed subject.

The other law relates to advertising, and adds the following section to the penal law:

SECTION 1142*a*. *Advertisements relating to certain diseases prohibited.*—Whoever publishes, delivers, or distributes or causes to be published, delivered, or distributed in any manner whatsoever an advertisement concerning a venereal disease, lost manhood, lost vitality, impotency, sexual weakness, seminal emissions, varicocele, self-abuse, or excessive sexual indulgence and calling attention to a medicine, article, or preparation that may be used therefor or to a person or persons from whom or an office or place at which information, treatment, or advice relating to such disease, infirmity, habit, or condition may be obtained is guilty of a misdemeanor, and upon conviction thereof shall be punished by imprisonment for not more than six months, or by a fine of not less than $50 nor more than $500, or by both such fine and imprisonment. This section, however, shall not apply to didactic or scientific treatises which do not advertise or call attention to any person or persons from whom or any office or place at which information, treatment, or advice may be obtained, nor shall it apply to advertisements or notices issued by an incorporated hospital or a licensed dispensary or by a municipal board or department of health or by the Department of Health of the State of New York.

ALDEN, P. **What France is doing for her disabled soldiers and sailors.** Progress (British Inst. of Social Service), Vol. XII, No. 1, January, 1917.

For the first eight months of the war the mutilated and disabled were practically objects of charity, their only succor being the "assistance publique," under the ministry of the interior. In April, 1915, the director of this service, M. Brisac, assumed chairmanship of an interministerial commission, comprising representatives of ministers of war, marine, public instruction, commerce, and agriculture, "to study the question in all its aspects, to settle the principles upon which it should be treated, and to assign parliamentary funds." The commission established the Institut de Saint-Maurice, near Paris, and the École Normale, at Bordeaux, and subsidized

private institutions at once to the amount of 2,000,000 francs. The Bordeaux school specializes in cases of loss of arms. One year later the responsibility was assigned to the coordinating national office for mutilated and discharged soldiers administered by the minister of labor, undersecretary of state for war (health service), and the director of public assistance and hygiene.

The office includes an administrative committee, a commission of reeducation, and a council for the study of improvements, and its work includes the following:

1. To keep a register of every soldier who by reason of wounds or illness resulting from the war has thereby suffered an important and permanent diminution of professional capacity, his civil status, his military situation, the nature of his invalidity, his previous occupation, and the new occupation he may have adopted because of his invalidity.

2. To maintain a list of work and employment available to disabled soldiers, distinguishing the kinds of employment suitable for each type of invalidity.

3. To coordinate all information received from institutions dealing with disabled soldiers and keep a statistical record of situations filled by them.

4. To collect all legislative and other documents relative to the treatment of disabled soldiers in France and abroad.

5. To unite in a common effort all departmental and local organizations for the welfare of disabled soldiers.

The national office does not concern itself with those wholly disabled and permanently unable to do any kind of work, and these are pensioned in proportion to their needs.

A man who is capable of reeducation for industrial employment is given the reeducation, and then work is found for him preferably "in his former employment [and locality], for which he would have the great advantage of knowing all the technical details of the work, in which he would have the sympathy of his fellow workers and the support of his trade-union, and in which he would be able to earn a greater or smaller proportion of his former wages, the State giving him a pension more or less the equivalent of that portion he can not earn." Artificial limbs are made suitable to the performance of his particular work. The office sees that there is an rganization in every industrial district to provide technical reeduation and subsequent employment for the men who joined the army n that district. The scheme comprehends 101 institutions and four hools (schools and prothesis workshop) for reeducation, and a .rge number of centers of surgical equipment will be established in very region of France. About 10 centers, in addition, are inde-

pendently organized by the ministry of war for the disabled prior to their discharge from the army.

Difficulty is experienced in getting the peasant to return to agriculture, so that if he insists upon his inability to resume it he is given the option of learning and undertaking poultry or beekeeping, horticulture, cheese or butter making, market gardening, and similar pursuits allied to general farming.

Centers of physiotherapy are calculated to care for "functional wounds," impaired muscular or articular functions, by means of mechanical appliances, heat, electric-light baths, water, gymnastics, massage, electricity, and radium emanations. Very striking results have been achieved at these institutions.

The average incapacity of patients during the month of December, 1915, on entering was 28.11, and on leaving, 0.96. During the four months ending December 31, 1915, 1,780 "functionally wounded" men, whose morbid condition had existed for an average period of six months before their treatment, were returned to the military depots, 290 to base duties, and 92 recommended for discharge at a gain to the State on their pensions and allowances represented by a capital sum of 10,000,000 francs.

The schools of reeducation receive men from the centers of surgical equipment and centers of physiotherapy. They are open to all discharged soldiers and sailors recognized. They may come either as boarders or as day scholars. During this time those who are in receipt of a provisional pension of 1.7 francs (32.8 cents) per day pay 1.2 francs (23.2 cents) of this to the school, keeping the remaining 0.5 franc (9.6 cents) as pocket money. When they receive their final military discharge and pension they are admitted gratuitously. Boarders are provided with food, lodging, washing, lighting, and heating. Day scholars receive 10.1 cents a day and keep their pension as well. Half of all pensions is retained, to be given in a single sum when the student leaves. The hours of work are eight per day. When men produce goods which are sold they receive the balance, less 10 per cent, left after deducting the cost of raw materials. Prizes are given for special diligence, and these often take the form of an outfit of tools for the trade which has been learned. The disabled man chooses what trade he will be taught and may change to another if he thinks he could do better at it. Any man is free to leave at any moment, only moral pressure being applied to induce him to stay until he is really equipped to earn a living. The average time taken to train men to earn their living at different trades is stated by the director of this school to be as follows, based upon 16 months' experience, with about 700 men:

Clerk, 3 months.

Draftsman, 10–12 months.

Leather worker, 8 months.
Shoemaker, 6 months for repair work.
Shoemaker, 8 months for repair work and new work.
Mechanic, 6 months.
Tailor, 8 months.
Tinsmith, 4 months for a town workshop.
Tinsmith, 8 months to work on his own account in the country.

In separate temporary buildings in the grounds a number of expert mechanics, released from the army for the purpose, were making artificial limbs and other surgical appliances. Plaster of Paris casts were made of the stumps of limbs or other injured parts of the body to be fitted, and of one whole leg when another leg was to be made to match it. This was admirably done, and of course obviated the necessity of repeated and tiresome fitting and trying on. The artificial limbs made here were of steel, leather, and felt of beautiful workmanship, but they appeared to me rather elaborate, expensive, and heavy.

Many of the men in training are not discharged men but are still in the army and therefore subject to discipline. Most of them are finally discharged when their medical treatment and school training are completed. Almost all trades and employments are taught: Bookkeeping, draftsmanship, typewriting, shorthand, English, harness making, shoemaking, hairdressing, carpentry, cabinetmaking, tinsmith's work, mechanics, tailoring, soap making, etc. Each workshop is under charge of a "foreman" or "professor," who was at first himself a maimed man, but now, since the military authorities took too many of these best men back into auxiliary services, is a civilian expert paid a regular salary. The men work (including their medical treatment) seven hours a day, and they are paid 2 cents an hour, rising to 4.1 cents as they advance in skill. They do work for the army or the public, or the product of their labor is sold commercially.

Dr. Vallée states "his fundamental aim to be to give the maimed man a genuine professional value, enabling him to resume his place in social life and to gain honorably his livelihood." To this end, the first question he puts to himself with regard to each man is: Can he be fitted to return to his previous employment? If so, every effort is made to enable him to do so, and he is reeducated in the appro-
iate workshop. If this is impossible—as when, for instance, a man
io has been a carpenter can no longer climb a ladder—then he is
ained in the job most nearly resembling his old one, to make use of
much as possible of his previous professional knowledge. Thus a
abled carpenter should become some kind of a woodworker, or a
abled plumber a tinsmith. The choice of a trade should depend
on a man's previous knowledge combined with his actual physical
titude.

An employment bureau has been established, which corresponds with employers of labor in the district to which the men belong, and places have already been found for a good many men. All the usual trades are taught in this school (Maison Blanche). Some officers are in the bookkeeping class, but men are learning basket work and leather work, shoemaking, french-polishing, and wood carving. Dr. Kresser has purchased 50 acres of land and hopes to start before long an agricultural school, in which will be taught farmyard work, beekeeping, and the use of motor tractors. He is strongly of opinion that professional reeducation should be made obligatory since, if men do not take up any work, the effect of the months of aimless unoccupied hospital life is to render them useless later on.

Ondes has 90 beds. The course of instruction lasts three months, and 300 men per year receive an agricultural training. The subjects taught are farm work, vineyard and nursery gardening, horticulture, blacksmithing, carpentry, and basketwork. An employment bureau has been established, but there are many more places offered than men to fill them. The director's report contains the following passage, and expresses the general feeling on this subject: "It appears to us indispensable that the disabled man should be reeducated while he is still a soldier; that is, while still subject to military discipline. Once become a civilian, the disabled man, almost in spite of himself, has but one wish—to return home, even if he vegetates there."

Juvisy is a small town on the Seine, about 20 miles from Paris, which, in addition to being an agricultural training school, is also a center of physiotherapy. Near Juvisy is a farm of 1,000 acres, and over 100 acres of this, together with farm buildings, has been taken on a three-years' lease for the purpose of training disabled men. Everything is provided for agriculture and rural industries, including cow houses, stables, dairies, piggeries, fowl houses, kennels, while a large garage and motor shop is being erected for the study of agricultural tractors. Although this school is primarily designed for men with all their limbs—of course, in a more or less disabled condition—it is intended to add to the number a few men with artificial limbs. This school is a free gift to France from foreign sympathizers, and it is hoped that the whole of the 1,000 acres will eventually be taken over. This school has been so recently established that it is impossible to say how far it is likely to be successful, but much money and thought is being expended upon the treatment that is there given, one of the main objects being to save men for country life, first by restoring to them, as far as possible, the use of their disabled limbs, and, secondly, by teaching them the principles and practice of subsidiary rural industries by which they can earn a good livelihood on the land they already possess.

There are two main institutions for the training of blind soldiers in France. One is the Maison de Convalescence, at Reuilly, and the other is Le Phare de France, in the rue Daru, Paris. The Maison de Convalescence was opened on March 29, 1915. It was erected by the ministry of the interior, but is partly dependent upon the ministry of war, since it receives undischarged soldiers. The State contributes 2.5 francs (48.3 cents) per man a day, and the difference is made up by an allowance from the budget of the hospital.

A further important contribution, without which the benevolent activity of the school would be greatly diminished, is made by a charitable society, known as L'oeuvre des Amis Soldats Aveugles, supported by contributions from French sympathizers in many parts of the world. A gift of 100,000 francs ($19,300), for instance, has been received from South America. This society presents an outfit of tools for his trade to every man leaving, and gives him a supply of raw material to start with, until his handicraft begins to bring in money. It also gives the man an outfit of clothing, called his "trousseau." It presents him with 500 francs ($96.50) on his marriage—30 men have married from the school—and treats all his comrades to coffee and a cigar on his wedding day. It also buys raw material in commercial quantities, and resells it at cost price to the men after they have set up business for themselves. It has, for example, just bought $58,398 worth of fiber for household brushes. In a word, the society adds a humanizing factor to the bare essentials provided by the State. Doubtless, the cheerfulness and briskness of the blind men throughout the school was a reflection of this wise and intelligent sympathy.

The school has 233 beds, and also receives a number of men who live in the neighborhood. Altogether it has had about 500 men in training, and about 300 have left it with a handicraft by which they can make a living. The director is Monsieur Emard. The subjects taught are brush making, basket making, typewriting, piano tuning, net making, upholstery fringes, cooperage, and massage.

The Phare de France was founded and is directed by Miss Winifred Holt, an American lady, who for many years devoted herself to the care of the blind in the United States. The funds are raised by an influential committee in America, and this Paris "lighthouse" was established in a large and pleasant house in the fash-
able quarter of Paris. The esteem in which Miss Holt and her
rk are held is shown by a recent official visit of the President of
Republic and the fact that she is allowed to take for training
blind soldier she may find in a hospital. The Phare de France
opened on August 18, 1916, so that there has not yet been time
complete training. Officers and men are alike admitted, 43 in

residence and about 20 living outside. Intelligence and industry, besides total blindness, are the only qualifications for admission.

The subjects taught range over a wide field and include more of what may be called the humanities than is usually found in such institutions—artistic pottery work, for example, which is stenciled by the blind, mathematics, music, foreign languages, weaving on elaborate looms, etc.

The Phare leaves the impression of a happy house party or a social center rather than an institution. The pupils clearly regard the place as a home, and blind officers and their friends come in to tea almost as in a club, sure of a hearty welcome and a pleasant hour of conversation, and music and laughter. This atmosphere is due, first, to Miss Holt's long experience with the blind, and, second, to her own sunny and energetic temperament, which diffuses cheerfulness and vivacity wherever she passes.

It is hoped to establish similar "lighthouses" in other parts of France.

Miss Holt's admirable and devoted work seems to supply a need hitherto unmet in France, whereby officers and those blind who require it may adapt themselves to an occupied but more or less leisure life, rather than to the training of those who will have to return to a workingman's environment and earn their livelihood at a trade.

Sir Henry Norman, in commenting on the conclusions to which he arrived, makes the following statement concerning the treatment of the blind soldiers in England:

"The training of the blind French soldier at the Maison de Convalesence suggests several considerations bearing upon our own treatment of this problem.

"First, the industrial training of the blind should be genuine professional training, not the well-meant efforts of amateurs. A man should be taught by a professional, the work he does should be work having a definite industrial and commercial value, and his training should not be regarded as complete until it has been a thorough apprenticeship, rendering him capable of doing industrial work with accuracy and at fair speed.

"In this connection it may be said that the best teacher will probably be found to be a man who was an expert at his job and has himself become blind.

"No handicraft should be permanently taught, the product of which requires an appeal to charitable sentiment for its disposal.

"Second, besides the teaching of what may be called the coarser kinds of work, advantage should be taken, in case of suitable men, of the qualities in which the blind man excels the seeing man to train the former to do work on a higher intellectual level. The blind

man's superiorities lie (1) in the exquisite development of the sense of touch, (2) his infinite patience, and (3) the pride he takes in the excellence of his workmanship. Clearly, therefore, precision work involving repetition is peculiarly suitable to the blind.

"Indeed, 'repetition' in the workshop sense of the word will be found to lie at the basis of a blind man's success. He is unduly handicapped in making a number of different parts and assembling them, whereas he is specially capable of dealing with a large number of identical parts requiring careful finishing.

"In conclusion, this French experience shows that a blind soldier, if wisely and efficiently trained, may be restored to a higher degree of industrial efficiency, bringing with it greater earning power than he possessed before his loss of sight."

It is impossible to give any adequate account of that portion of the report which deals with the work in prothesis by Prof. Amar, who for many years has studied the problems of the physiology of the workman performing the work of his trade. Up to the present he has restored to work about 1,300 men. "Prothesis" is the Greek word meaning "addition," and signifies the provision of artificial apparatus to perform, so far as possible, the work of an amputated limb or replace a lost function.

The Amar system of prothesis comprises in every case three stages:

1. The investigation of physical fatigue and mental aptitude. That is a scientific determination of exactly what is physically left to the man as the result of his wound and amputation, and what his mental coefficient is.

2. Education of the amputated man's stump in sensitiveness.

3. Education of the complete limb, consisting now of both stump and artificial limb.

It is only when the man has passed through these three stages that his "professional reeducation"—that is, his training to perform his actual industrial job—takes place.

Suggestions of an administrative nature, based upon the experience of France and the United Kingdom, are appended to this study, but would not necessarily apply to America unless similar organizations were in being or contemplated and the percentage of disabled assumes relative proportions. These suggestions may be found printed in the Monthly Review of the United States Bureau of bor Statistics for June 1917, Vol. IV, No. 6. [Measures already dertaken by the Government of Canada to rehabilitate in produc-e employment the disabled from her expeditionary forces are also be found in this same Monthly Review, pages 867 et seq. The riewer from a recent visit to France can attest to the enthusiasm th which regular army medical officers take up such work as ysiotherapy.] (C. N. F.)

REPORTS.

REPORT OF CEREBRO-SPINAL FEVER IN THE ATLANTIC FLEET.

By C. P. KINDLEBERGER, Medical Inspector, United States Navy.

From July 1 to December 31, 1916, there were no cases of cerebro-spinal fever in the Atlantic fleet. The following interesting case was admitted to the sick list of the *Pennsylvania* on February 16, 1917 (notes taken from the health record):

"H. C. C. A–S.—Age, 19. Diagnosis—Meningitis, cerebro-spinal. Brought to sick bay at 5:30 a. m., after he had gotten out of his hammock and fallen to the deck. Patient appeared at the dispensary yesterday, complaining of frontal headache. Temperature, 99.4 F.; pulse, 42; respiration, 16; sluggish reaction of pupils to light; unable to arouse him to reply to questions; Kernig's and Brudzinski's signs positive; rigidity of post cervical muscles noted; showed mental attitude characteristic of meningitis; vomited twice during day; W. B. C., 12,000. Lumbar puncture at 7 p. m.: 40 mils cerebro-spinal fluid withdrawn and 20 mils Flexner's serum injected—spinal fluid cloudy and pink; W. B. C., 5,000 per cubic millimeter; also contained numerous red-blood cells. Culture on blood serum showed large actively motile gram-positive bacillus, later identified as belonging to subtilis group, 2–17–17. Lumbar puncture: 20 mils spinal fluid withdrawn and 20 mils Flexner's serum injected. Fluid slightly pink and decidedly cloudy; culture showed same bacillus as above (bipolar staining with methylene blue). Discharged to duty, March 6, 1917, well." Patient subsequently developed insufficiency of ocular muscles, for which glasses were prescribed on the *Solace*, to be worn for 3 to 6 months.

This case was not considered one of cerebro-spinal fever, for the following reasons: A subtilislike bacillus was found twice in the spinal fluid, in pure culture; meningococci were never found; patient recovered promptly, without serious sequelae, after two lumbar punctures and injections of Flexner's serum; no other cases of meningitis have occurred on board, up to the present time (August 30); patient had been on the *Pennsylvania* for eight months when he was taken ill, and influenza was quite prevalent at the time he was admitted.

From January 1 to March 25, 1917, we may then safely say that cerebro-spinal fever was absent from the ships of the Atlantic fleet. On the latter date a mess attendant from the *Walke* was sent to the Norfolk Naval Hospital with this disease. No further cases developed until April 13, when a case was sent from the *Missouri* to the Philadelphia Naval Hospital. After this there was an interval of four days before the disease began to appear daily on a number of the ships.

The onset of the disease in epidemic form can be traced to several causes, namely:

1. The unusual prevalence of cerebro-spinal fever and other contagious diseases in all parts of the United States at that time.

2. Rapid recruiting and marked increase in the size of the Navy after the declaration of war.

3. The military necessity for transferring recruits to the fleet from the training stations *without the usual period of detention* and weeding out of the physically unfit.

4. The overcrowding and at times lack of sufficient clothing and bedding at these stations and on some of the ships of the fleet.

5. The presence of infected individuals and "carriers" among the recruits.

When the epidemic started the following general sanitary rules and regulations were promulgated and strictly enforced:

(*a*) Transfer actual or suspected cases of contagious diseases to the hospital ship or hospital immediately.

(*b*) Air bedding daily and keep ship open to air and sunshine as much as possible.

(*c*) When recruits are received give bichloride bath, spray nose and throat, disinfect clothing, inspect daily, and isolate if practicable.

(*d*) Recruits shall be kept and drilled and worked in the open air as much as possible.

(*e*) The habit of sleeping on deck (except on the main deck) shall be forbidden.

(*f*) The cups of the fountain drinking device on the scuttle butts shall be sterilized daily.

(*g*) Spit kids shall be thoroughly cleaned and supplied with a disinfectant solution (formaldehyd) three times a day.

(*h*) A dampener (wet sand or paper) shall be scattered on the decks of the living spaces before sweeping.

(*i*) Swabs used between decks shall be cleaned daily by boiling or washing and then aired.

(*j*) The water used for cleaning the gun and berth decks shall contain a disinfecting solution (cresol).

An attempt was made to detect "carriers" by staining smears from the nose and throat, but none were discovered by this method. This

result was to be expected, in view of the following: "Carriers of meningococci can only be detected by cultural methods; stained smears from the nose and throat are useless for this purpose" (Amoss and Chickering).

The data recorded in the following table were obtained from the ships on which cerebro-spinal fever appeared from the hospital ship *Solace* and from the several naval hospitals to which the patients were finally transferred. From March 25 to August 7, 1917, 118 cases are listed in chronological order.

At the present time the epidemic is practically over. Unless we can discover all the "carriers" and no more infected recruits are transferred to the fleet, we may expect to have sporadic cases at irregular intervals for some time yet. Recently health conditions at the training stations have greatly improved. Recruits are now properly clothed, well fed, and adequately housed in well-constructed sanitary barracks, erected since the beginning of the war. They are held as long as possible, and the physically and mentally unfit are being rapidly weeded out. Every effort is also being made to detect and eliminate "carriers" and those suffering with prodromal or actual symptoms of contagious diseases from the drafts, transferred from time to time to the ships of the fleet.

As suggested in an editorial in the July, 1917, number of the UNITED STATES NAVAL MEDICAL BULLETIN, the ideal method of eliminating the physically and mentally unfit from the naval service would be to enlist the aid of a number of patriotic specialists in every recruiting district. It is, of course, realized that this method could not be properly carried out in war time. After a recruit has been given the usual physical examination he could be provisionally accepted, and then sent to the above-mentioned specialists for further examination. Cultures should be taken from the nasopharynx to detect "carriers"; the blood, urine, and feces critically examined; the eyes, ears, nose, and throat carefully gone over; a Wassermann test made; a skiagraph of the chest taken or a Von Pirquet or Calmette reaction studied; the presence of a stricture or chronic gonorrhea determined; the feet examined by an orthopedist; and tests undertaken by an alienist to determine recruit's mental age and condition.

United States Atlantic Fleet—U. S. S. Pennsylvania, Flagship.

CEREBRO-SPINAL FEVER.

Initials.	Rate.	Age.	Ship.	How long on board.	From what station or ship received.	Date admission.	Type of case.	Symptoms of special interest and complications.	Meningococcus found.	Disposition (obtained from hospital).	Comment.
A. M.	MsA-3		Walke			Mar. 25				To duty	Transferred to Naval Hospital, Norfolk.
L. R. L.	Sea-2	20	Missouri	14 days	Great Lakes Training Station.	Apr. 13	Ordinary	Marked delirium		do	Transferred to Naval Hospital, Philadelphia.
P. W. B.	do	20	Arizona	3 days	do	Apr. 17	do			Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
C. H. K.	do	20	Connecticut	2 days	do	do	Fulminant.	Respiratory infiuenza.		do	Do.
T. C. R.	do		Great Lakes Training Station.		do	do	Ordinary			do	Do.
C. O. H.	do	24	New York	18 days	do	Apr. 18	do	Petechial rash		do	Do.
O. J. H.	Sea	22	Connecticut	6 mos	U. S. S. Vermont	Apr. 21	Fulminant.	Respiratory influenza.		Died	Do.
R. L. H.	AS	17	do	6 days	Great Lakes Training Station.	do	Ordinary			Convalescent.	Do.
C. D. A.	do	16	Delaware	2 days	do	do	do	Petechial rash		do	Do.
F. B.	Sea-2	21	Arizona	20 days	do	Apr. 22	do		Yes	do	Do.
C. M. H.	do	21	Connecticut	7 days	do	do	Fulminant.	Respiratory influenza.		do	Transferred to Naval Hospital, Norfolk.
W. J. H.	do	19	do	do	do	do	do	do		do	Do.
F. C.	do	20	New York	do	do	do	Ordinary	Petechial rash; tonic spasm.		do	Do.
C. H. B.	AS NNV	19	North Carolina	29 days	Connecticut Naval Militia.	do	do	Petechial rash; hernia.	Yes	Died	Transferred to Naval Hospital, Portsmouth.
L. J. A.	Sea-2	18	Arizona	7 days	Great Lakes Training Station.	Apr. 23	do	Mastoiditis operation		Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
J. S.	AS	19	Arkansas	8 days	do	do	do			Died	On board.
W. L.	Sea-2	16	Wyoming	11 days	do	do	do	Simulating influenza	Yes	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk
D. W. A.	do	19	Arizona	8 days	do	Apr. 24	do			do	Do.
B. N. L.	Sea	22	Connecticut	1 year	do	do	do	Profuse purpura		do	Transferred to Naval Hospital, Norfolk.
M. E. J.	Sea-2	19	New York	10 mos	do	do	Fulminant.	Petechial rash; stiff neck.		Died	Do.
W. H. G.	do	18	Michigan	9 days	do	do	Ordinary	Pan-ophthalmitis		Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.

			.....do.....	...Do....	.....do.....	...do.....	.....do.....		.....	.....do.....	Transferred to Naval Hospital, Norfolk.
J. McN....	...do.....	19	.....do.....	7 days....	.....do.....	...do.....	Fulminant.		.....	Died.....	Do.
C. R. H...	...do.....	21	Connecticut...	10 days..	.....do.....	Apr. 25	.....do.....	Respiratory influenza.	.....	.....do.....	Transferred to *Solace* and Naval Hospital, Norfolk.
H. R. R....	...do.....	17	Michigan.....	8 days...	.....do.....	...do.....	Ordinary...		.....	.....	Transferred to *Solace*.
O. L. E....	...do.....	17	Utah.....	10 days..	.....do.....	...do.....	.....do.....		.....	Died.....	Transferred to *Solace* and Naval Hospital, Norfolk.
F. W. R....	.....do.....	18	Alabama.....	47 days..	Newport Training Station.	...do.....	.....do.....		.....	Convalescent.	Transferred to Naval Hospital, Norfolk.
L. W. B....	.....do.....	19	Arizona.....	20 days..	Great Lakes Training Station.	Apr. 26	.....do.....		.....	Died.....	On board.
G. M. W....	AS.....	17	Arkansas.....	4 days...	.....do.....	...do.....	.....do.....	Membrane on tonsil-rash.	Yes...	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
R. T.....	F-2.....	20	Baltimore.....	31 days..	Newport Training Station.	...do.....	Fulminant.		.....	Died.....	Do.
L. H. T....	Sea-2.....	16	Connecticut...	7 days...	Great Lakes Training Station.	...do.....	Ordinary...		.....	Convalescent.	Do.
C. C. B....	...do.....	18	Arizona.....	21 days..	.....do.....	Apr. 27	.....do.....		.....	.....do.....	Do.
F. E. D....	F-3.....	19	Connecticut...	8 days...	.....do.....	...do.....	Fulminant.	Respiratory influenza.	.....	.....do.....	Do.
M. J. A....	Sea-2.....	18	North Dakota.	34 days..	Newport Training Station.	...do.....	.....do.....	Early stupor—no rigidity.	.....	Died.....	Transferred to *Solace*.
A. O. S....	SC-2.....	32	Fanning.....	.....	.....	...do.....	Ordinary...	A with strychnine poisoning.	.....	Convalescent.	Transferred to Naval Hospital, Philadelphia.
S. R.....	Sea-2.....	19	Arizona.....	14 days..	Great Lakes Training Station.	Apr. 28	.....do.....		.....	.....do.....	Transferred to *Solace* and Naval Hospital, Norfolk.
A. G. E....	F-3.....	18	Connecticut...	9 days...	.....do.....	...do.....	Fulminant.	Respiratory influenza.	.....	Died.....	Transferred to *Solace*.
C. A. K....	...do.....	18	.....do.....	15 days..	.....do.....	...do.....	.....do.....	.....do.....	.....	.....	Reedy Island Quarantine Station.
N. H.....	Sea-2.....	18	Michigan.....	2 days...	.....do.....	...do.....	Ordinary...		.....	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
S. C.....	...do.....	17	Alabama.....	15 days..	Newport Training Station.	...do.....	Fulminant.		.....	Died.....	Transferred to *Solace*.
R. R.....	...do.....	17	Montgomery..	1 day....	R. S., Norfolk.....	...do.....	.....do.....	Fell on deck in stupor.	.....	.....do.....	Transferred to Naval Hospital, Norfolk.
J. L. B....	...do.....	17	Arizona.....	14 days..	Great Lakes Training Station.	...do.....	Ordinary...		.....	.....do.....	Transferred to *Solace* and Naval Hospital, Norfolk.
H. E. C....	...do.....	18	Michigan.....	40 days..	U. S. S. Prairie.....	Apr. 29	.....do.....		.....	.....	Transferred to *Solace*.
A. J. C....	...do.....	18	New York.....	15 days..	Great Lakes Training Station.	Apr. 30	.....do.....	Petechial rash marked.	Yes...	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
J. C. P....	AS.....	18	Arkansas.....	34 days..	.....do.....	...do.....	.....do.....		.....	.....do.....	Do.
W. M.....	Sea-2.....	18	Montana.....	9 days...	.....do.....	May 1	.....do.....	D with malaria 5 days before A.	.....	.....do.....	Transferred to Naval Hospital, Norfolk.

United States Atlantic Fleet—U. S. S. Pennsylvania, Flagship—Continued.

CEREBRO-SPINAL FEVER—Continued.

Initials.	Rate.	Age.	Ship.	How long on board.	From what station or ship received.	Date admission.	Type of case.	Symptoms of special interest and complications.	Meningococcus found.	Disposition (obtained from hospital).	Comment.
J. G. C.	Sea-2	20	Baltimore	6 days	Norfolk Training Station.	May 1	Ordinary			Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
D. D. B.	do	20	Arizona	8 days	Great Lakes Training Station.	May 2	do			do	Do.
W. C.	do	16	Prometheus	do	R. S., Norfolk	do	Fulminant.	Paralysis eye muscles.		do	Transferred to Naval Hospital, Norfolk.
C. H. F.	do	19	Seattle	6 days	Newport Training Station.	May 3	do	Albuminuria	Yes	do	Transferred to *Solace* and Naval Hospital, Norfolk.
R. L. M.	Pvt. M. C.	21	Utah	7 mos.	Marine Barracks, Norfolk.	May 4	Ordinary	Admitted with measles		do	Do.
G. A.	MsA-3	21	Arizona	6 mos	R. S., New York	May 5	do			do	Do.
T. O. J.	Sea-2	23	Arkansas	13 days	Great Lakes Training Station.	do	Fulminant.	Exudate on tonsils	Yes	Died	Transferred to *Solace*.
E. A. M.	do	18	do	12 days	do	do	Ordinary	Petechial rash	do	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
W. R.	As	18	Delaware	37 days	Newport Training Station.	May 6	do		do		Transferred to *Solace*.
L. M. H.	do	19	Florida	17 days	Great Lakes Training Station.	do	Fulminant.	Petechial rash		Died	Transferred to *Solace* and Naval Hospital, Norfolk.
C. A. C.	Sea-2	23	Montana	13 days	do	do	Ordinary			To duty	Transferred to Naval Hospital, Norfolk.
M. H.	F-2		Rowen			do	Fulminant.			Died	Do.
S. A. W.	Sea-2	19	Oklahoma	24 days	R. S., Norfolk	do	Ordinary	Pneumonia and Pleurisy.		Convalescent.	Do.
W. E. T.	AS	17	Delaware	12 days	Newport Training Station.	do	do			do	Do.
L. F. B.	Sea-2	16	Arizona	20 days	Great Lakes Training Station.	May 7	do			do	Transferred to *Solace* and Naval Hospital, Norfolk.
C. F. P.	Lt.	30	Arkansas	60 days	U. S. S. Florida	do	do			do	Transferred to Naval Hospital, Boston.
H. R. M.	Pvt. M. C.	21	New York	13 mos	Marine Barracks, New York.	do	Fulminant.			do	Transferred to Naval Hospital, Norfolk.
C. C. B.	Sea-2	16	Arizona	20 days	Great Lakes Training Station.	May 8	Ordinary			Died	Transferred to *Solace* and Naval Hospital, Norfolk.

			Vestal	18 days	R. S., Norfolk	do	do			Convalescent.	Transferred to Naval Hospital, Norfolk.
R. M. C.	Sea-2	18	Nebraska	20 days	Great Lakes Training Station.	May 9	do			do	Transferred to *Solace* and Naval Hospital, Norfolk.
A. B. O	do	17	Montgomery	11 days	R. S., Norfolk	do	Fulminant.			Died	Transferred to Naval Hospital, Norfolk.
M. C. S	do	18	Florida	26 days	Great Lakes Training Station.	May 12	Ordinary	High temperature		Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
G. W. C	do	18	Baltimore	20 days	Norfolk Training Station.	May 14	Fulminant.	Symptoms of drug poisoning.		Died	Transferred to Naval Hospital, Portsmouth.
S. McM	WT	34	Maine	11 mos	R. S., New York	May 15	do	Mania	Yes	do	Transferred to Naval Hospital, New York.
H. A. P	Sea-2	17	Arizona	30 days	Newport Training Station.	May 17	Ordinary	Mumps		Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
N. C. B	do	20	Michigan	15 days	Great Lakes Training Station.	do	do		Yes	do	Do.
J. V. R	do	20	North Dakota	57 days	do	do	do	Early rigidity of muscles.		do	Do.
C. A. K	do	18	Connecticut	30 days	do	May 18	do			do	Transferred to Naval Hospital Philadelphia.
M. R	SC-2	23	Minnesota	3½ years	R. S., Norfolk	May 20	Fulminant.			Died	Transferred to *Solace* and Naval Hospital, Norfolk.
R. W. B	Sea-2	18	Prometheus	31 days	U. S. S. Vestal	do	Ordinary			Convalescent.	Transferred to Naval Hospital, Norfolk.
B. G. C	AS	16	do	23 days	R. S., Norfolk	do	do				Transferred to *Solace* and Naval Hospital, Washington.
W. R. S	F-2	27	Jupiter	7 mos	do	May 21	do		Yes	Convalescent.	Transferred to Naval Hospital, New York.
C. V. B	AS	17	do	29 days	Great Lakes Training Station.	do	do				Transferred to *Solace* and Naval Hospital, Washington.
H. L. G	Sea-2	23	Montana	30 days	do	May 22	Fulminant.			Died	Transferred to Naval Hospital, Norfolk.
J. H. C	do	23	Wisconsin	32 days	N. N. V. New York	May 24	Ordinary	Kernig's and Babinski's positive.		Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
R. E. R	do	17	Michigan	33 days	Great Lakes Training Station.	do	do			Died	Do.
K. R. C	do	21	Vermont	60 days	do	May 26	do		Yes	Convalescent.	Transferred to Naval Hospital Philadelphia.
A. J. L	do	17	do	38 days	Newport Training Station.	do	do			do	Do.
H. L. C	do	17	Georgia	60 days	U. S. S. Georgia	May 27	do	Mania		do	Transferred to Naval Hospital, Boston.

United States Atlantic Fleet—U. S. S. Pennsylvania, Flagship—Continued.

CEREBRO-SPINAL FEVER—Continued.

Initials.	Rate.	Age.	Ship.	How long on board.	From what station or ship received.	Date admission.	Type of case.	Symptoms of special interest and complications.	Meningococcus found.	Disposition (obtained from hospitals.	Comment.
S. R. L....	F-2.....	20	Michigan.....	1¾ years.	Newport Training Station.	May 28	Ordinary ..	.....	Yes...	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
J. H. H....	Sea-2.....	19	Seattle.....	30 days..	.....do.....	...do.....	Fulminant.	.....	...do...	.....do.....	Do.
J. P.....	F-3.....	22	South Carolina	9 days...	R. S., Norfolk	May 30	.....do.....	.....	...do...	Died.....	On board.
R. C. G....	...do.....	21	Dixie.....	.....	.....	May 31	.....do.....	Measles.....	.....	Convalescent.	Transferred to Naval Hospital, Philadelphia.
H. M.....	Sea-2.....	19	Florida.....	25 days..	U. S. S. Kentucky....	...do.....	Ordinary...	.....do.....	.....	.....do.....	Transferred to *Solace* and Naval Hospital, Norfolk.
A. B. J....	AS.....	20	Texas.....	30 days..	Portsmouth, N. H....	June 2	.....do.....	Pronounced endocarditis ac.	.....	Died.....	Transferred to *Solace*.
C. F. M....	Sea-2.....	17	Montana.....	41 days..	Great Lakes Training Station.	June 3	Fulminant.	.....	.....	.....do.....	On board.
G. M. N....	...do.....	20	Vestal.....	1 day....	.....do.....	...do.....	Ordinary...	Kernig's positive.....	.....	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
M. S. S....	F-3.....	20	Utah.....	4 days...	R. S., Norfolk	June 4	.....do.....	Admitted with malaria	Yes...	.....do.....	Do.
C. E. R....	Sea-2.....	19	Kentucky.....	10 days..	Norfolk Training Station.	...do.....	.....do.....	.....	.....	.....do.....	Transferred to Naval Hospital, Norfolk.
G. S. W....	F-3.....	22	Utah.....	6 days...	R. S., Norfolk	June 6	.....do.....	.....	.....	.....do.....	Transferred to *Solace* and Naval Hospital, Norfolk.
J. F. H....	Sea-2.....	17	Michigan.....	1 year...	Newport Training Station.	...do.....	.....do.....	.....	.....	.....do.....	Do.
J. F. U....	F-3.....	19	Nevada.....	34 days..	R. S., New York.....	June 10	.....do.....	Measles.....	.....	.....do.....	Do.
F. H. B....	...do.....	21	Wisconsin.....	19 days..	U. S. S. New York....	June 13	Fulminant.	Admitted with typhoid fever.	Yes...	Died.....	Transferred to *Solace*.
J. T. H	WT.....	25	Wyoming.....	3 years..	U. S. S. Alabama.....	June 14	Ordinary...	Symptoms of influenza	...do...	Convalescent.	Transferred to *Solace* and Naval Hospital, Norfolk.
J. G. B....	Sea-2.....	19	Arizona.....	7 mos....	U. S. S. New Hampshire.	June 15	.....do.....	.....	...do...	.....do.....	Do.
P. J. K....	F-2.....	26	Vermont.....	6 mos...	R. S., Boston.....	...do.....	.....do.....	.....	...do...	.....do.....	Transferred to Naval Hospital, Philadelphia.
C. W. P....	Sea-2.....	19	.....do.....	53 days..	Newport Training Station.	...do.....	.....do.....	.....	...do...	.....do.....	Do.
J. R. W....	AS.....	20	Von Steuben..	1 day....	R. S., Philadelphia....	...do.....	.....do.....	.....	...do...	.....do.....	Do.

		8	Utah	7 days	R. S., Norfolk	June 16	do			do	Transferred to Navy Hospital, Norfolk.
J. W. C.	Y-2	17	Von Steuben	do	R. S., Philadelphia	June 18	do	Paralysis right arm	Yes	do	Transferred to Naval Hospital, Philadelphia.
M. B.	Sea. NNV.	22	Vermont	60 days	Chicago, Ill.	June 21	do	Pneumonia, broncho	do	do	Do.
C. F. S.	Sea-2	18	Nevada	63 days	R. S., Norfolk	do	do	Complained only of headache.		do	Transferred to *Solace* and Naval Hospital, Norfolk.
J. E. G.	F-3	21	Michigan	24 days	R. S., Boston	June 24	do	Mumps	Yes	do	Transferred to Naval Hospital, Norfolk.
R. M. S.	Sea-2	22	do	23 days	Puget Sound	June 25	do			do	Do.
C. C. C.	do	17	Rhode Island	19 days	Newport Training Station.	June 27	do	Admitted with mumps		do	Do.
A. DeR.	do	18	Oklahoma	39 days	Great Lakes Training Station.	June 28	Fulminant			Died	On board.
F. X. W.	F-3	19	Arizona	36 days	Newport Training Station.	July 13	Ordinary		Yes	do	Transferred to Naval Hospital, New York.
H. D. L.	Mid-3	20	Oklahoma	53 days	Naval Academy	July 17	do	Petechial rash marked	do	Convalescent.	Transferred to *Solace*.
H. E. R.	PhM-1	21	Wisconsin	75 days	U. S. S. Iowa	July 18	Fulminant			Died	Do.
L. L. T.	Blks	25	Oklahoma	7 mos.	R. S., Norfolk	July 20	Ordinary	Petechial rash			Transferred to *Solace* and Naval Hospital, Norfolk.
A. E. S.	Sea	21	Connecticut	2 years	Naval Hospital, Philadelphia.	Aug. 5	Fulminant.	Macular eruption—Kernig's.			Do.
W. H. B.	Ens. NNV	41	Kearsarge	4 mos.	Massachusetts Naval Militia.	Aug. 7	do			Died	Transferred to Naval Hospital, Boston.

NOTE.—July 27, Charleston reports one cerebro-spinal fever "suspect" transferred to naval hospital; no report of confirmation of diagnosis received to date (Aug. 30).

Summary:

Cases		118
Cases discharged to duty		3
Cases under treatment		76
Deaths (27.11 per cent)		32
Final disposition not known		7
Transferred to *Solace*		67
Transferred to *Solace* and Naval Hospital, Norfolk, Va		80
To *Solace* and Naval Hospital, Norfolk	53	
To Naval Hospital, Norfolk, direct	27	
Other naval hospitals		21

Vessel.	Number of cases.	Vessel.	Number of cases.
Alabama	1	Nebraska	1
Arizona	15	Nevada	2
Arkansas	6	New York	5
Baltimore	3	North Carolina	1
Connecticut	13	North Dakota	2
Delaware	3	Oklahoma	4
Dixie	1	Prometheus	4
Fanning	1	Rhode Island	1
Florida	3	Rowen	1
Georgia	1	Seattle	2
Great Lakes Training Station	[1] 1	South Carolina	1
Jupiter	1	Texas	1
Kearsarge	1	Utah	5
Kentucky	1	Vermont	5
Maine	1	Vestal	2
Michigan	12	Von Steuben	2
Missouri	1	Walke	1
Minnesota	1	Wisconsin	3
Montana	4	Wyoming	2
Montgomery	2		

[1] This patient was taken ill en route from the Great Lakes Training Station to the fleet; he was not transferred to a ship, but to the Naval Hospital, Norfolk, Va., via *Solace*.

Ordinary cases	83
Fulminant cases	34
Not known	1
Number received from—	
Great Lakes Training Station	55
Norfolk Training Station	3
Newport Training Station	15
R. S., *Norfolk*	14
R. S., *New York*	3
R. S., *Philadelphia*	2
R. S., *Boston*	2
Vessels of fleet	10
Other sources	10
?	4
Number on board—	
From 1 to 30 days	75
From 30 days to 6 months	25
From 6 to 12 months	8
From 1 to 2 years	3
Over 2 years	2
?	5

REPORT OF AN EPIDEMIC OF CEREBRO-SPINAL MENINGITIS AT THE UNITED STATES NAVAL TRAINING CAMP, SAN DIEGO, CAL.

By A. FARENHOLT, Medical Inspector, United States Navy.[1]

In July, 1917, an epidemic of cerebro-spinal meningitis occurred at the United States Naval Training Camp, San Diego, Cal., among recruits received from the naval training station at San Francisco. Sixteen cases occurred, one of which terminated fatally. The first case appeared June 10 (became ill on the train while enroute from San Francisco), the last on July 25, 1917. The patients were all treated at the municipal isolation hospital, an institution maintained by the board of health of the city of San Diego.

The complement of the station at the onset of the epidemic was approximately 1,600 men, who were quartered in large buildings originally erected to display exhibits during the Panama-California Exposition.

A study of the epidemiological conditions present at the camp during the first days of the epidemic revealed two factors which were of prime importance in the spread of the disease, namely, the presence of carriers of the meningococcus and some general insanitary conditions existing in the buildings used for quarters, which tended to lower the resistance of the recruits quartered in them. The means employed in eradicating the disease may, accordingly, be considered in two groups:

First. A bacteriological survey of the entire command for the purpose of isolating and treating the carriers of meningococci.

Second. The general sanitary measures applied to the camp.

The bacteriological survey was difficult, inasmuch as no laboratory facilities existed in the camp and because of the fact that laboratory appliances and material were exceedingly difficult to obtain on the Pacific coast. Fortunately, the board of health of the city of San Diego possessed a well-equipped laboratory, presided over by Dr. H. A. Thompson, the city bacteriologist, who enrolled as an assistant surgeon in the Naval Coast Defense Reserve, and, with Assistant Surgeons L. H. Clerf, P. W. Wilson, United States Navy, Passed Assistant Surgeon C. L. Williams, U. S. P. H. S., and Dr. F. L. Kelly of the California State Board of Health, began the survey. The bacteriological procedures were at first carried out in the city laboratory, it as it was soon realized that the station required an efficient labotory for the performance of future work, two rooms were set apart the surgical building for a station laboratory. Fixtures were inalled and material and supplies purchased. Twenty-four days after e rooms were assigned for laboratory purposes they were completely

[1] Written in collaboration with Passed Assistant Surgeon W. M. Kerr and Assistant rgeon L. H. Clerf, United States Navy, and Assistant Surgeon H. A. Thompson, N. R. nited States Navy.

equipped, and a portion of the work was being done there by Passed Assistant Surgeon Williams, U. S. P. H. S., and Dr. Kelly.

The survey was conducted as follows: Groups of from 50 to 100 men were cultured, early in the work, every other day; later, when the working force became more efficient, daily. The material from the postnasal space for culture was taken by a laryngologist, Dr. R. J. Fly, of San Diego, whose dexterity undoubtedly prevented unnecessary contamination. The sterile swab holding this material was passed by him to the bacteriologist, who inoculated plates, as described below.

When the laryngologist had finished taking cultures all men in the group were given a spray of argyrol 2 per cent, both nares and the postnasal space being thoroughly sprayed. The group was then marched to quarters and kept separate from men who had not been cultured. At 3 o'clock in the afternoon this group was again marched to the sick quarters for nose and throat treatment, which was repeated at 10 a. m. the following morning. In this way all men cultured received three intensive throat treatments before the report from the laboratory arrived. When the report of the bacteriological findings in this group was received those men who had been demonstrated not to be meningococcus carriers were released from quarantine and granted liberty; those men who were found to have suspicious organisms (gram negative cocci) growing in their throats were isolated in a special detention camp until their cultures were run through sugar media, when they were found either to be free from infection or to be carriers. If free from infection they were liberated and granted liberty. If they were proven to be carriers of the meningococcus they were placed in another isolation camp, which was occupied only by true carriers. In both of these camps the men were given intensive throat treatment by means of the argyrol spray.

The spray treatment was given under the supervision of a medical officer, who was assisted by a squad of five men. The spraying apparatus was mounted on a small truck and consisted of a one-quarter horsepower electric motor and an air tank from which two tubes lead to spray bottles with metal tips, enabling two carriers to be sprayed at once. The spraying squad of five men was organized as follows:

Two men manipulated the spray, spraying the anterior nares; then, after depressing the tongue, the postnasal space. When the spraying was completed in each case the spray bottles were detached from the hose containing the compressed air and passed to two men, who passed the metal tip through the alcohol flame. The remaining, or fifth man, kept the record of the men sprayed. When this squad became efficient four carriers could be thoroughly sprayed by the two sprayers each minute. An average of 250 men were sprayed daily. Men isolated in the camp for true carriers were liberated after three

negative cultures, taken one week apart, had been reported from the laboratory.

The same requirement applied to patients ill of meningitis at the municipal isolation hospital.

It was found that in the majority of the carriers the infection was of a temporary nature. In a small number of cases the infection was persistent and required weeks of intensive spray treatment to eradicate it.

Total number of men cultured	1,583
Total number of true carriers isolated	80
Percentage of true carriers	5.05

The details of the bacteriological work in the laboratory as described by Drs. Thompson and Clerf are as follows:

Step No. 1.—The material obtained from the nasopharynx of the patient to be examined is smeared immediately over the surface of freshly prepared sheep serum agar plates. Two plates are smeared for each case, the swab being smeared over the first and then the second plate, or the second plate may be smeared with a sterile bent rod from plate No. 1. Both methods were found to be satisfactory. This second plate may appear unnecessary, but in a certain number of single-plate smears the colonies are so numerous that a careful study of a single colony is impossible. In such cases the second plate usually shows discrete, well-separated colonies. Mark the plates inoculated with the serial number and bring to the laboratory at once and place in the incubator (37 C.).

Step No. 2.—Plates are examined in 24 hours and all suspicious colonies are examined microscopically. A small amount of the suspicious colony is then inoculated on an egg slant. Ascitic fluid agar was used for a time but, on account of the scarcity here of ascitic fluid, egg media was substituted with good results. Meningococci do not grow so readily or rapidly on egg media, but satisfactory results were obtained.

Step No. 3.—Plates are returned to incubator for 24 hours longer. After being cultured on egg slants for 24 hours at 37 C. the suspicious colonies are examined and if gram negative diplococci are still present inoculations are made on carbohydrate media.

Step No. 4.—Examine cultures on carbohydrate media for acid production and on egg media for type of growth.

In the examination for acid production four tubes, designated as B, C, and D, were used. These tubes contained ascitic fluid agar, which 1 per cent of the fermentable sugar was added, together th 1 per cent of the Andrade indicator, with the reaction of the dia set to this indicator. Tube A contained glucose, tube B mal- se, tube C levulose, and tube D galactose. The Andrade indicator to be preferred to the litmus solution, which was used for some

time, as the reactions of the former are more plainly evident. Fermentation of maltose and glucose only is indicative of meningococci. Such cultures should be examined microscopically; if gram negative on sugar media, seal the egg media with paraffin and keep for further serological tests. The throat culture from such a case showing gram negative diplococci when the maltose and glucose cultures are examined microscopically is to be considered as positive, and the patient to be treated as a carrier. The plates of such a case can be imediately discarded. If in doubt, make subcultures on media stated above.

Step No. 5.—All petri dishes with discarded cultures are placed in a 10 per cent cresol solution for 1 hour, and then boiled for 5 minutes, transferred to a soap powder solution and boiled for 20 minutes, rinsed in water and then placed in battery fluid. (Potassium bichromate, 60 grams, dissolved in 300 mils of distilled water, then add 460 mils sulphuric acid; use this in the strength of 1 part of solution to 10 of water.) Remove at end of 2 hours, rinse very thoroughly, and then allow to drain until dry; wrap and sterilize in hot-air sterilizer (160 C. for one to one and one-half hours). This method was instituted following an overwhelming glassware contamination by the bacillus subtilis and has proven satisfactory.

Step No. 6.—All used slides are immersed in 5 per cent lysol solution for 24 hours, cleaned in tap water, and placed in 70 per cent alcohol, so as to be ready for further use.

DETAILS REGARDING THE MICROSCOPIC EXAMINATION OF SUSPECTED COLONIES.

Divide perfectly clean fat free slides in four to five equal proportions, place in the center of each space one drop of filtered water, emulsify therein a small amount of the suspected colony. The slide then is air-dried and fixed by passing through flame. Stain for one-half minute with carbol gentian violet (10 c. c. of saturated alcoholic solution of gentian violet to 100 c. c. of a 2 to 2½ aqueous carbolic acid solution). Wash off stain and apply Gram's solution for one-half minute; decolorize with 95 per cent alcohol, and counterstain with diluted carbol fuchsin 1 to 10 or diluted safranin. (A saturated solution of safranin is made in 95 per cent alcohol. This stock solution is diluted 1 part to 10 parts distilled water for counterstain, and can be stained for about one-half minute. This makes a very excellent counterstain, and appears to give sharper definition than dilute carbol fuchsin.) Every worker is advised to test his Gram solution and stain every morning by using staphylococci and a known strain of meningococci mixed on the same slide.

The culture medium used for primary isolation is sheep serum agar. This is prepared as follows:

(*a*) *Veal broth.*—Use ordinary veal (bob veal), trim off all tendon and fat, keeping only muscle tissue; grind, weigh, and mix with distilled water, using 1 gram of the veal to 2 mils of water. Keep this mixture in the ice box overnight (24 hours); then press out all liquid, using a piece of fine muslin; place in rice cooker and bring to a boil; strain through flannel and then add peptone (Fairchild), 1 per cent; sodium chlorid, ½ per cent; bring to a boil to dissolve these added ingredients; cool to 5 C. This throws down a fine precipitate, which is removed by filtering through double filter paper. Flask and sterilize in autoclave for 20 minutes at 20 pounds pressure.

(*b*) *Nutrient agar.*—To veal broth add powdered agar to make a 3 per cent agar solution; autoclave for 30 minutes to dissolve; titrate and correct to 0.4 plus phenolphthalein; cool to 45 C.; bring to volume by addition of distilled water; add the albumen of two eggs, and stir well; then place in compound filter; autoclave for 20 minutes at 20 pounds. Allow the autoclave to cool until a vacuum is created; then allow air to enter the autoclave through the stopcock, and leave filter in place until the media has entered the jars (about 15 minutes); remove flannel from necks of jars and strain through flannel; flask and sterilize 20 minutes at 20 pounds (third sterilization).

The compound filter used in the preparation of agar media consists of (*a*) a straight-side, flat-bottom receptacle (preferably agate ware), sufficiently large to accommodate three to four pint jars; (*b*) three or four wide-neck, straight-side jars (Mason pint fruit jars); (*c*) short glass rods, diameter ¼ inch; (*d*) Canton flannel and string. To use, moisten the Canton flannel and place over the neck of the jar (using double thickness), and fasten firmly with string. Place glass rods in bottom of the receptacle. The jars are then placed neck downward on the glass rods in the bottom of the receptacle. If the jars are small, tilting may occur. This can be prevented by using a wooden reel or other simple contrivance to give support. Having assembled the filter, pour media into the receptacle and autoclave for 20 minutes at 20 pounds. During this sterilization a partial vacuum is produced in the jars. When the autoclave is cool an equal negative pressure exists in both autoclave and jars. Upon opening the stopcock, the pressure in the autoclave immediately becomes positive, and an automatic filtration takes place. It important to have the glass rods placed under the jar necks to low the entrance of the media. This method of filtration was not iginal here, but was found very satisfactory.

(*c*) *Sheep serum water.*—Prepare sheep serum water by mixing part of perfectly clear, fresh sheep serum with 3 parts of distilled ıter. Sterilize in the autoclave for 40 minutes at 15 pounds pres- re, or in the Arnold sterilizer for 30 minutes on three successive

days. To obtain a clear serum, it is advisable to collect the blood in cylindrical jars or other suitable containers, and then place them in the cold-storage rooms for 24 hours before being transferred from the slaughterhouse to the laboratory, thus securing a clear, straw-colored fluid, instead of the heavy, blood-stained serum which is seen when blood is considerably agitated before clotting has set in. To make the sheep serum agar, the nutrient agar is melted and the sheep serum water is added (1 part of sheep serum water to 5 parts of nutrient agar). In this connection it is important that the agar be cooled to 48 or 50 C. before the sheep serum water is added, in order that a transparent media be obtained. If added to a hot agar, the resulting media is often quite turbid.

When ready to pour plates, melt the veal agar in the autoclave, cool to 48 C.; add sheep serum 1 part to 5 parts of veal agar and dextrose 1 per cent. The dextrose may be kept in a sterile 25 per cent solution. Then pour plates. It is always well to incubate plates overnight before using. In this way all contaminated plates can be detected and discarded.

Ascitic fluid agar.—Ascitic fluid agar is prepared by adding to 3 parts of melted and cooled 3 per cent veal agar 1 part of warm ascitic fluid. Melted agar is tubed by means of sterile funnel or sterile burettes and immediately slanted. Avoid the formation of air bubbles.

Ascitic fluid agar with Andrade indicator is made as follows: Prepare ascitic fluid agar as described above. To 135 c. c. of this melted agar (100 c. c. of veal agar plus 35 c. c. of ascitic fluid) add 1.5 grams of glucose, levulose, maltose, or galactose, respectively, and 1 per cent of the Andrade indicator. This mixture is gently shaken, and by sterile funnels tubed in small test tubes and slanted properly.

Andrade indicator.—Acid fuchsin, 1 gram; distilled water, 100 c. c. N/1 sodium hydroxide, 16 c. c. (stock solution). Use 1 per cent of this solution.

Egg media.—Wash 10 to 20 eggs with soap and water. Flame end of egg, break the shell, and stir the yolk and white of the eggs very thoroughly. Strain through cheesecloth and distribute by means of sterile funnels into small test tubes. Heat slowly to 70 C. to expel the air. Solidify at a temperature of 75; sterilize on three successive days in Arnold sterilizer at a temperature of 90 to 100 C.

NOTE.—Test the above media with known meningococci strains.

THE MORPHOLOGICAL CHARACTERS OF THE MENINGOCOCCUS.

On the sheep serum agar the meningococci appear as small, discrete, whitish colonies, which, with direct light, show a fairly uniform haziness throughout. With reflected light, the surface is shiny and assumes a "mother-of-pearl" appearance. On egg media

it varies from a very light lemon yellow tint to a distinct yellow color. Confusing organisms most commonly found are the *Micrococcus flavus*, *Micrococcus catarrhalis*, and the *Micrococcus pharyngis siccus*. The latter organism often gives irregular reactions on carbohydrate media as well as in its agglutinative properties, and causes considerable confusion, but its growth on egg media is quite characteristic, being of a grayish yellow or yellowish color, the surface dry and somewhat irregular, and the colonies firmly adherent to the media.

The macroscopic slide agglutination method described by Krumwiede was used for a short time, but the results were not satisfactory, so that complete reliance was placed on the fermentable reactions of gram negative diplococci on carbohydrate media. With this method the percentage of positive carriers might probably have been slightly increased, but it provided for the isolation of all questionable cases. A suitable agglutinating serum was not available in the early part of the work, but in the future it is hoped that all cases can be checked up in this manner.

The general sanitary measures applied to the camp were as follows:

Ventilation of the exposition buildings.—These buildings are large structures, designed primarily for the shelter of exhibits of various character. Their ventilation depended on currents of air entering through doorways and small ornamental windows placed generally midway between the floor and the roof. The heated air from the lower regions of the building ascended to leave through rows of ventilators in the sides of skylights on the roof. These ventilators were partly closed by wooden slats designed to prevent the entrance of rain.

With this arrangement of the openings for ventilation, large volumes of stagnant air collected in various portions of the buildings. To remedy this defect a series of ventilating holes 5 by 2 feet were cut in the walls of each building, 2 feet above the floor, and the wooden slats in every other ventilator in the roof were removed. With these alterations the ventilation of the buildings became satisfactory.

Exclusion of new infection from outside.—A recommendation was made to the Bureau of Navigation that no recruits be sent to this camp from other training stations until it was reported that the camp was free from infection, the epidemic having subsided, and the car-
s among the present complement having been determined and
ated. The bureau approved this recommendation and no new
ifts were received.

n the meantime a detention camp having a capacity of 480 men
l capable of some expansion was constructed for the reception of
newcomers. In this camp provision was made for the complete
lation of the inmates in groups of 30.

Prevention of the spread of the disease to the city of San Diego.—As soon as it was realized that the occurrence of meningitis in the camp was assuming epidemic proportions, liberty for all men under instruction was stopped. With the exception of the chief petty officers and a few of the older petty officers living with their families in San Diego, no man was granted liberty until a culture taken from his postnasal space demonstrated him to be free from meningococci. Furthermore, *the camp was closed to all visitors from the city.*

The evacuation of infected buildings.—The majority of cases came from one large building used as a detention barracks for men lately arrived on the station, and from a balcony in the Southern California Building used as a ward by the medical department. As the weather conditions in San Diego during the greater portion of the year are ideal for outdoor sleeping, the men quartered in the detention barracks were moved out on a large lawn, where they slept on cots in the open air. They were kept in detention until proven free from infection. The sick in the ward on the balcony were isolated in tents and were not returned to duty until a culture from the postnasal space negative for meningocicci demonstrated them free from infection.

Segregation of the personnel in small groups.—As far as was practicable the men attached to the camp were segregated into groups of 200 or 250. These groups did not mingle so far as it was possible to prevent it. Each group was quartered, drilled, bathed, and messed separately from the other groups. A talk was given to each group concerning the epidemic, and the men were cautioned against close contact.

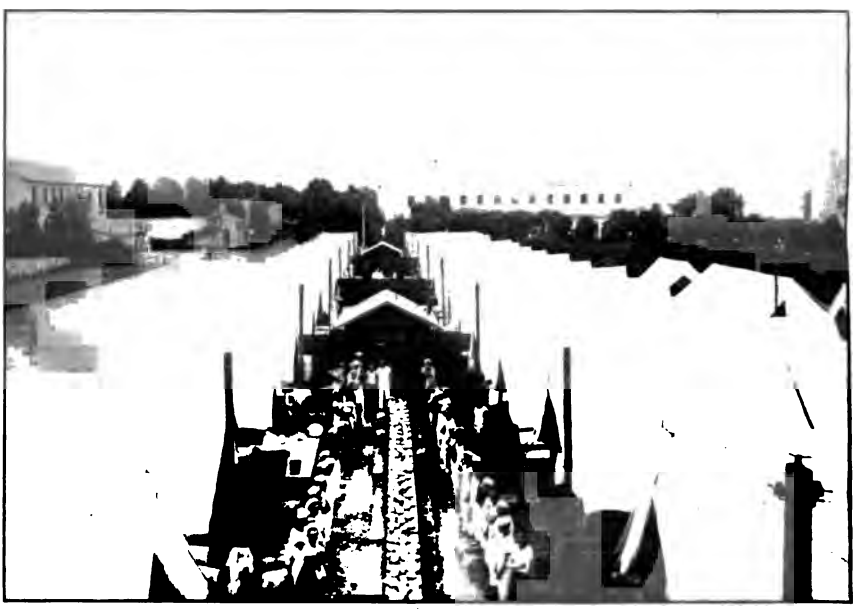
Disinfection by sunlight.—As the meningococcus has little resistance, advantage was taken of the abundance of sunlight prevalent in San Diego. Large frames were constructed, upon which the bedding was placed daily and allowed to remain flooded with sunlight until late afternoon. The mess tables, which at first were set up in a large building used during the fair as a restaurant, were moved out into a broad street, where they were exposed, with the mess gear face up, to the direct rays of the sun throughout the day. The men were kept out of doors as much as possible, with the result that the entire command soon assumed the tanned aspect of sailors who had cruised long on tropical seas.

DESCRIPTION OF THE ISOLATION CAMP.

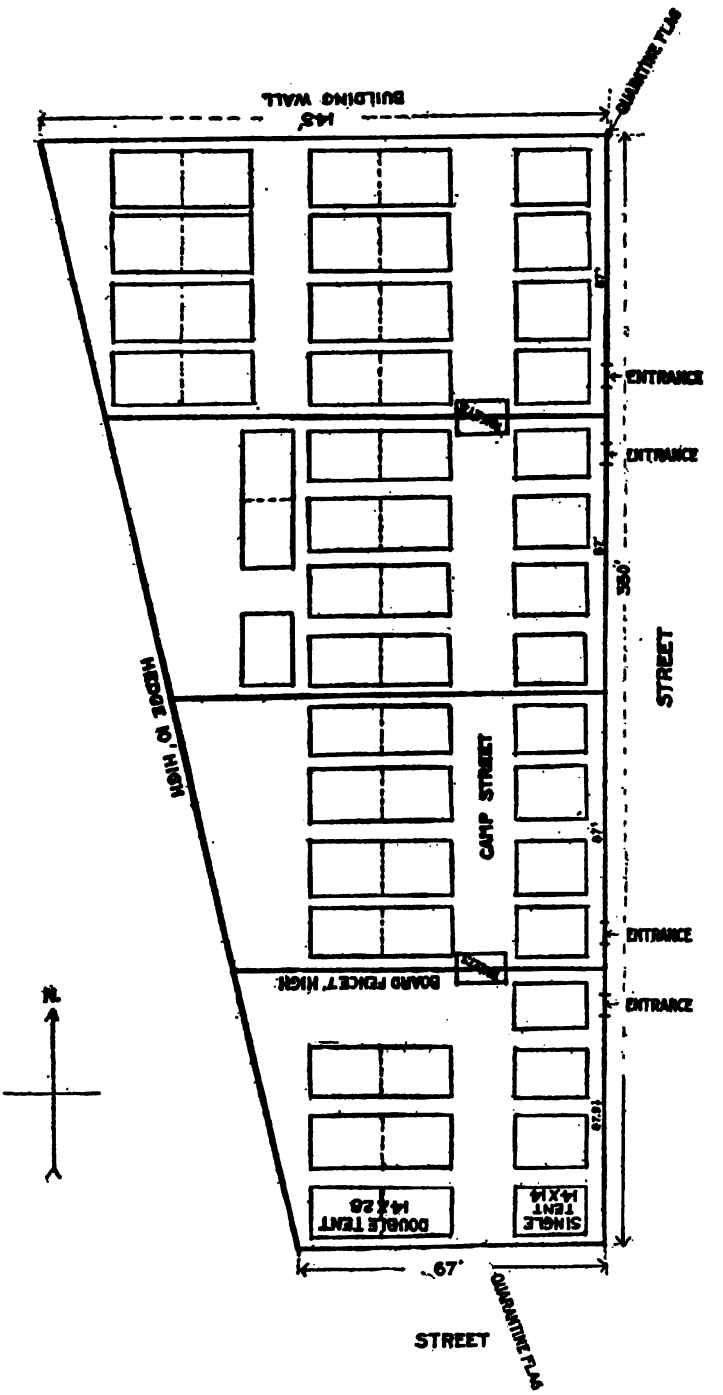
The ground available and used for this purpose is a somewhat irregular rectangle, 350 feet in length, 67 feet in breadth at one end and 143 feet at the other. This space is divided into four sections by board fences 8 feet high; a high wire fence surrounds the camp.

Isolation Camp, Training Station, San Diego, Cal.

VIEW OF TENT USED FOR BED CASES, ONE SUCH FOR EACH PADDOCK. OTHERS. SLEEP IN "GOLD MEDAL" COTS, USING THEIR OWN MATTRESSES AND BEDDING.



VIEW OF CAMP STREET.



Ground plan of isolation camp showing division into four sections.

Each section holds eight tents 14 by 14 feet, hospital size, placed two to each platform on the lower row, and four tents 14 by 14 feet on the upper or street row. A street 12 feet wide runs between these two rows. One single tent is used as an entrance, Hospital Corps, and dispensary tent, and a space capable of holding a double platform in rear is kept open for clotheslines, etc.

Between each two sections is placed a small house 9 by 10 feet completely divided in the center line, to which the fence comes. On each side of this is a toilet, washbowl, shower, and washboard.

Owing to somewhat more space being available in sections 3 and 4, these are able to accommodate a larger number of tents (see plan attached).

Section 1 holds	54;	may be expanded to	88
Section 2 holds	66;	may be expanded to	88
Section 3 holds	84;	may be expanded to	112
Section 4 holds	114;	may be expanded to	152
	318		440

The food is prepared in station galley and transported to camp, a distance of 150 yards, by three push carts. Messing is, at this season, done in the open street between tents.

Ordinary cases sleep in camp cots, using their own bedding. More severe bed cases occupy regular hospital beds with mattress, pillows, and linen, of which a sufficient number is always held available.

REPORT ON CEREBRO-SPINAL MENINGITIS AT BOSTON, MASS.

By L. W. McGuire, Passed Assistant Surgeon, United States Navy.

Nine cases of cerebro-spinal meningitis in the Navy developed in and about Boston during the latter part of May and early part of June. Seven of these cases were treated in the Boston naval hospital and two in civilian hospitals. One death occurred in a civil hospital.

The early symptoms were severe headache, vomiting, fever, stiffness of neck, Kernig's sign, and leucocytosis. A leucocytosis varying from 12 to 28,000 was always present and was a valuable aid.

A lumbar puncture was made in every patient who presented symptoms in any way suggestive of meningitis. This is a simple procedure resulting in no harm to the patient whether he had meningitis or not, and its free employment established an early diagnosis which otherwise was often impossible.

The spinal fluid in a positive case was usually turbid, when the first puncture was made, early in the disease, but not invariably so, as occasionally a clear fluid was obtained which on microscopical

examination was positive. The spinal fluid always became turbid as the disease progressed.

On obtaining a cloudy spinal fluid the specific serum was immediately injected. If the general symptoms were marked the serum was injected even if the spinal fluid was clear. In all but one patient the meningococcus was found. The cell count of the spinal fluid was usually from 7 to 19,000. A daily cell count was found to be an excellent check on the progress of the disease and the treatment. A rapid fall in the count takes place after the first injection of the specific serum and the drop continues each day, serum usually becoming clear after the fourth day, with abatement of the general symptoms, which indicate sufficient treatment has been received.

The treatment consisted of injecting 15 c. c. of Flexner's serum after recovering 20–30 c. c. of spinal fluid and repeating this every day for four days, which is ample for the average case. In very severe infections two injections were given in one day. Raising the foot of the bed following the injections was found to be beneficial. Several injections were made into the lateral ventricles in one case in which spinal injections did not relieve the symptoms; recovery followed.

Complications were not numerous; the most serious was deafness—one case of complete deafness in both ears, and one deaf in one ear, which is probably permanent. One man had an acute arthritis left wrist, an acute orchitis, and a pericardial friction rub, all of which subsided.

The importance of an early diagnosis was clearly demonstrated, and the results obtained in this hospital were due to a large extent to getting these cases early, establishing a diagnosis, and immediately beginning treatment with the specific serum. In any case of suspicion or doubt immediate lumbar puncture is imperative.

A COURSE FOR STUDENT MEDICAL OFFICERS.

By R. B. Greenough, Surgeon. United States Naval Reserve Force.

It is possible that a number of medical officers may be interested in the course for student medical officers, which was arranged in Boston at the Harvard Medical School and the Boston hospitals in ne and July, 1917, for the training of the 1917 graduates in medi-e who entered the Naval Coast Defense Reserve, class 4. There e 24 junior officers assigned to the naval hospital in Chelsea for is instruction, and after the course had been planned 11 more were ailed to Boston from Portsmouth, N. H., making a class of 35.

The instruction was based largely upon the course given in the val Medical School in Washington, but with certain modifications

designed to make up, so far as possible, for the lack of hospital experience on the part of these officers, who left the medical school before the close of their fourth year.

The general arrangement of the course was as follows: Early morning hours were given up to section and laboratory work. At 12 o'clock a clinical lecture was given at one or another of the hospitals. In the afternoon an hour was devoted to drill, and there was a lecture or demonstration at the naval hospital on naval administration and organization and military medicine.

The subjects studied and the instructors were as follows:

Bacteriology.—Laboratory course, mornings, for two weeks.

Exercises were given in the identification and culture of pathogenic organisms, the preparation and standardization of vaccines, dark-field illumination, throat cultures, agglutination, etc.

Professor, H. C. Ernst, Harvard Medical School.

Parasitology and tropical medicine.—Laboratory work, mornings, for two weeks.

The diagnosis and treatment of malaria, amebic and bacillary dysentery, yellow fever, beriberi, and other tropical diseases were taught, together with more important animal parasites.

Professor, E. E. Tyzzer; Assistant Professor, A. W. Sellards.

Preventive medicine and hygiene.—Laboratory course, all day, for two weeks.

This was considered to be a very important part of the training, and an abundance of time was given for these exercises. Subjects included in this course were: Water supply, food poisoning, ventilation, specific prophylaxis of diseases, vaccines, antitoxins, quarantine, prevention of diphtheria, pneumonia, meningitis, plague, typhus, typhoid, etc., camp sanitation, sewage and garbage disposal, venereal prophylaxis, vaccination, sanitary water analysis, examination of food for adulterants, milk analysis, sanitary analysis of air, carbolic coefficient tests.

Professor, M. J. Rosenau.

Examination and diseases of the blood.—Laboratory work, in sections, mornings of one week.

An opportunity was given for making the more important examinations in the blood diseases.

Assistant Professor, Francis Peabody.

X-rays.—Practical work, in sections, at the different Boston hospitals, mornings of one week for each student.

This included the general technic of taking and developing plates as well as their interpretation.

Instructor, G. W. Holmes, and assistants.

Clinics and clinical lectures were given at the Massachusetts General Hospital and at other hospitals in Boston on the following subjects:

Legal medicine.—Two exercises, medicolegal post-mortem examinations.

Dr. G. B. McGrath, medical examiner of Suffolk County.

General medicine.—Twelve clinical lectures.

The subjects included in these clinical lectures were as follows: Typhoid, paratyphoid, acute rheumatic fever, endocarditis, pericarditis, acute and chronic nephritis, headache, constipation, aortitis, pleurisy, failure of compensation, pneumonia, bronchitis, early tuberculosis, diabetes, hyperacidity, gastric and duodenal ulcer.

Professor, H. A. Christian, Instructors, W. H. Smith, Drs. J. B. Hawes, 2d, and F. G. Brigham.

Three clinical exercises were also given to the class in sections at the contagious department of the Boston City Hospital on diphtheria, septic sore throat, scarlet fever, measles, cerebro-spinal fever, infantile paralysis, and mumps.

Assistant Professor E. H. Place.

Surgery.—Six clinical lectures.

The exercises included: Gunshot wounds, infected wounds, tetanus, gas-bacillus infections, Carrel treatment, fractures, hernia, acute abdominal emergencies, cranial surgery, anæsthesia, shock, hemorrhage, and transfusion.

Two special lectures were given on genito-urinary surgery, including gonorrhea, chancroid, and bubo.

Three lectures were given on tuberculosis of joints, chronic arthritis, and the prevention of joint complications, especially in relation to military surgery.

Assistant Professor R. B. Greenough, Assistant Professor C. L. Scudder, Professor C. A. Porter, Dr. D. F. Jones, Dr. G. G. Smith, Dr. Mark Rogers, Dr. Lyman Hapgood, and Dr. Horace Stevens.

Professor C. L. Gibson, of the New York Hospital, also gave a lecture, while on a visit to Boston, upon the Carrel treatment of war wounds, based upon his own experiences in France and Belgium.

Syphilis.—Three clinical demonstrations were given covering the early and late manifestations of syphilis, its treatment, and the value of the Wassermann reaction.

Assistant Professor C. M. Smith.

Dermatology.—Three clinical demonstrations were given on the more important skin diseases—parisitic and inflammatory.

Instructor, F. E. Burns.

Psychology.—Four clinical lectures were given at the Boston Psychopathic Hospital, on the forms of mental disease likely to be encountered in military practice.

Professor, E. E. Southard.

Ophthalmology, nose and throat, otology.—Four exercises in ophthalmology, two in diseases of the nose and throat, and two in otology were given by Passed Assistant Surgeon D. J. Heffernan, U. S. N. R. F., at the naval hospital in Chelsea.

Naval military medicine.—Six lectures.

These lectures included the organization and duties of the Medical Department—Records, supplies and equipment, recruiting, landing parties, camp sanitation, and personal hygiene; Hospital Corps—Drill and organization, sea service, inspection, sick call, ventilation, food inspection, battle quarters, hospital ships, and quarantine.

Surgeon J. M. Brister, U. S. N., Naval Hospital, Chelsea.

The services of all of the civil instructors in this course were given gratuitously and at some inconvenience. The facilities of the Harvard Medical School and of the hospitals in Boston were also volunteered for the purposes of the course, and the actual cost for the preparation of supplies and for the supplies consumed, amounting to about $250, was paid by the State of Massachusetts, on recommendation of the committee of public safety. To all of these volunteer participants the Navy is indebted for their generous and patriotic service.

EXTERMINATION OF MOSQUITOES AT THE NAVAL PROVING GROUND.

By F. P. W. Hough, Passed Assistant Surgeon, United States Navy.

The location of the naval proving ground and smokeless powder factory is such that the station has always had a bad reputation for mosquitoes, and each year malaria has been responsible for a heavy loss to the Government both in actual time lost by sick employees and the unsatisfactory work done by men suffering with anemia and other sequelae of malaria yet continuing at their work. Many of these men were of course infected in their homes in the surrounding country, but a large percentage were undoubtedly bitten by infected mosquitoes on the station, especially while working the night shifts.

Mosquitoes have been so numerous in previous years that it was a very easy matter to obtain large numbers of eggs, larvae, and pupae from any pool when the writer arrived here one year ago, and about 10 per cent of these would be Anopheles.

Oil had been used regularly, and all Navy quarters and offices were well screened. The first, while theoretically good, was not practical, for this is swamp land, and the oil was excluded from parts of the surface of many of the pools by pieces of twigs, grass, etc., and these bare spots would furnish good breeding places. It was also next to impossible to reach many of the pools and properly treat them on

account of the heavy undergrowth. Other points entering into the difficulty evidently were the lack of interest and ignorance on the part of the laborers assigned to this work, and the number of pools scattered over a large area, necessitating long walks on hot days, when it was far more comfortable for the laborer to rest in some cool spot and allow the mosquitoes to continue their breeding unmolested. Screens supplied in this latitude are of such coarse mesh that mosquitoes have no difficulty in negotiating them, and from personal knowledge it was impossible at this time last year, or to be correct three weeks later, to obtain a comfortable night's sleep, owing to the swarms of the pests in sleeping quarters.

During a previous tour of duty here (1908) certain experiments were made along the lines of mosquito control, and the insects were fairly well eliminated from the station, but no definite results were recorded and no reliable data could be submitted. This year a campaign was started in the early spring, and all work has been carefully supervised with reliable results.

The insecticide used is a by-product in the manufacture of powder, ordinarily valueless and washed into the creek as it accumulates. It is commonly known as "nitre cake," but is really sodium acid sulphate, with impurities, and containing about 30 per cent free acid. When this solid, partly granular, substance is placed in water it dissolves slowly, and it has been found that when mosquito eggs are deposited in water containing as low as 10 per cent by volume of the sulphate the eggs will hatch, but the larvae nearly all die, and it is rare that any reach the pupal stage. A much stronger solution is of course desirable and pools have been well loaded here, so that rains have not lowered the strength of the solution appreciably, and as the water evaporates some of the sulphate is deposited on the edges of the pool to be later redissolved when more water accumulates. It has of course been necessary to eliminate all stagnant water where this was possible, but there are many parts of the station where this is not practicable.

Grass and weeds are killed around the pools by the action of the acid, and this is really an advantage on land of this character, though it would prevent the use of this substance in many places, such as rice fields, irrigation ditches, and ornamental lakes.

It has the advantage, however, of being a waste product here; herefore the total cost of the campaign has been the pay of one ommon laborer assigned to the work and the supervision of the edical officer. The laborer is instructed to put a quantity of the cake" in every pool or stagnant body of water he finds about equal one-third of its contents, and he revisits each place treated about nce in three weeks. The hearty cooperation of the men employed

in civil engineering work here in locating many of the pools and reporting to the medical officer has been a great aid. The employees and other persons residing in the surrounding country have also cooperated in the fight and have rid many places of tin cans, etc., in an effort to stamp out malaria.

All persons questioned and as many more who have made voluntary statements agree that mosquitoes have been controlled and almost eliminated from this reservation. The number of cases of malaria has correspondingly decreased, and no new cases have been treated this year. It is possible to sit on the lawns in the evening without the discomfort of these pests, and a mosquito inside a house is almost a curiosity.

SANITARY REPORT ON VLADIVOSTOK, SIBERIA.

By C. B. Camerer, Passed Assistant Surgeon, United States Navy.

The following notes were taken while the U. S. S. *Buffalo* was awaiting the return of the American commission from Petrograd.

Population.—Estimated at 97,504 (census of 1910), and divided as follows:

Russians and other whites	62,504
Chinese	25,000
Japanese	5,000
Coreans	5,000
Total	97,504

Those of the Jewish race, heretofore barred from the city, are now permitted to reside therein.

Prevailing diseases.—The port at time of visit, June, 1917, was quite healthy. Epidemics are stated to be rare. Prevailing diseases at this time were scarlet fever, pneumonia, pulmonary tuberculosis, and a surprisingly small amount of typhoid fever. Vaccination against variola is compulsory.

Prostitution.—Very prevalent, and venereal diseases, especially gonorrhea, excessively so. Police surveillance, such as it is at present, is most lax and inefficient. Prostitutes are not segregated but are scattered throughout the city, nearly all hotels and rooming houses being infested with them.

Water Supply.—No municipal water system is installed. All potable water is derived from a small river about 1½ miles distant, and from wells sunk in the bed thereof or throughout the city proper. Water from the former is conveyed to the town in barrels and tanks for distribution to the consumer. The railroad has its own pumping plant at the river and has water for the use of shops piped therefrom. The naval port likewise has its own independent system, the

supply being derived from wells, pumped into a reservoir, and then distributed through mains throughout the reservation.

Disposal of refuse.—There is no municipal sewerage system, although one was projected but work thereon was held up at the outbreak of the war. There are one or two private sewers in operation emptying either directly into the harbor or into a number of cesspools, the contents of the latter ultimately finding its way either to "truck" gardens or into the harbor, as above.

The naval port has its own sewerage system, also discharging into the bay.

The health department, or, more properly speaking, the medical department of the commission, now representing what may be termed the Government, supervises the disposal of garbage and other refuse, same being either collected and incinerated or carried away in tanks by Chinese coolies and dumped into the bay.

With few exceptions, earth or vault closets are in general use; no night soil was observed. Drainage of the city, wholly by natural means, is excellent, it being laid out upon a steeply sloping hillside, the soil being but thinly spread over the underlying rock, which frequently crops out.

Closets of the poorer classes are stated to be very filthy, but typhoid and the dysenteries are surprisingly infrequent.

Climate.—The climate is not very good, temperatures ranging as low as —20 F. in winter and from 60 to 90 F. in summer. The bays are frozen over for about six weeks during the months of December and January. The winters are usually very dry, with slight snowfall. No rain falls from November until March. Winters are characterized by very high, cold winds. Fogs are very prevalent during the months of May and June. The summer rains are moderate in precipitation. The best months of the year are August, September, and October.

Hospitals.—Hospital facilities at the time of visit were inadequate, due, in major part, to the great influx of people since the beginning of the war, and as a result the local institutions are taxed to full capacity. Those in operation are the naval hospital, situated in the naval port; the municipal hospital, partly completed and in excellent condition; four military hospitals or lazarettos, necessary for the 62,000 soldiers in and about the city; and a private hospital ned and operated by a Dr. Blumenfeldt, a very capable surgeon.

The following hospitals were visited:

Naval hospital.—This is situated in the naval port and consists of group of four buildings, viz:

1. Main and administration.
2. Pharmacy and storerooms.
3. Venereal wards.

4. Contagious wards.

The buildings are well built of brick and stone with vitreous tile flooring. The ventilation in the main building is quite poor; a ventilating system was to have been installed, but work thereon was discontinued upon the outbreak of the war. All buildings of the group are steam heated.

This hospital has a capacity of 250 beds, located in four main wards. The operating rooms, toilets, and wards are all dirty and poorly kept. Many patients were observed in bed fully attired, boots and all. This hospital has its own sewerage system. The operating rooms are poorly lighted and drained. Instruments and appliances appeared plentiful, but show neglect. There were 240 inmates at time of visit, throat diseases, gastrointestinal disorders, and appendicitis prevailing.

The laboratory facilities were very poor both as to apparatus and condition, which may be accounted for in part by the departure of the entire laboratory force for active service some time since.

Sterilizing facilities consist of autoclaves, etc., in fair condition only. All hospital supplies seemed to be ample in quantity, but some, such as cotton, etc., rather doubtful as to quality. The library was very good for its size and well supplied with current foreign journals. The laundry connected with the hospital is in fair condition, but bathing facilities are poor. Food supply is ample and of good quality.

Entire equipment is generally in a poor and neglected condition. Among the different articles of equipment, static machines, Mueller tubes (water cooled), vibrators, bath cabinets, Finsen light cabinets, diagnostic lamps, etc., were observed.

Women (wives and dependents of officers and men) are cared for in separate wards. There were several obstetrical cases in the building at time of visit.

The general equipment of this hospital can not be rated as good, according to our standards.

Nursing is performed by both male and female attendants. There were three medical officers on duty at the time of my visit.

Venereal prophylaxis is not compulsory, nothwithstanding the high rate of damage to personnel, due to venereal disease; but all are advised to take the treatment as required, provision being made for its administration at all times.

Municipal Hospital.—This hospital is well located on high ground and is admirably constructed throughout. There are six large wards and many quiet rooms. All working people who pay 1 ruble a year are admitted. Others pay at the rate of 1 ruble a day, which is not enough to cover expenses, and the remaining cost is defrayed by the municipality. The hospital is well equipped and administered. The

buildings are of brick and stone and are all fireproof. All wards are very clean and well appointed, and their equipment is excellent. Special clinics for eye, ear, nose, and throat cases, also for obstetrical, gynecological, and dental cases; all operating rooms are well lighted and ventilated.

This hospital has two large operating rooms, one each for "clean" and "dirty" surgical cases. Both of these are in excellent condition as to appointments, instruments, sterilizers, lights, etc. Patients are conveyed to the operating rooms by wheeled litters. The receiving wards are in a separate building, where the incoming patients are bathed, diagnosed, and subsequently forwarded to the proper departments. The laboratory of this hospital is very good, typhoid and other vaccines being manufactured. No Wassermanns are made at present. Case records are very carefully kept. All wards are well lighted and ventilated, and are excellently furnished. Diet kitchens, toilets, etc., were in good condition. Electric elevators are installed.

These buildings were first occupied in 1912 and belong to a series of 10 similar structures planned. The hospital maintains its own ambulance service and has several house physicians in attendance, also 8 to 10 internes. Its normal capacity is 250 patients, but it is said to be always overcrowded, there being over 300 at time of visit.

All venereal cases are kept in a separate building. Pharmacy and storerooms are in the receiving building. Stores and food were ample, the latter excellent. Cotton is poor (from Japan). Contagious diseases are well isolated. There were many cases of pneumonia at time of visit. Due to overcrowding, a large number of patients were cared for in the halls and corridors. The buildings are steam heated, electrically lighted, and well ventilated throughout.

Quarantine and pratique.—There are no quarantine regulations for naval vessels, unless they report the presence of contagious diseases on board, when the use of the naval hospital is permitted. Incoming merchant vessels are inspected by the port health authorities and pratique granted by them via the customs house. There is no apparatus installed for the disinfection or fumigation of vessels, and rat guards, etc., are not required for merchant vessels at the docks. Bills of health for outgoing steamers are obtained from the consuls and visèed at the customs house. This latter step is not necessary for men-of-war.

Prisons.—There is one large municipal prison and a police station. They are reported to be in fair sanitary condition. The former has a small infirmary with a capacity of about 20 beds. Vermin are very prevalent in the prisons, as well as plentiful throughout the town, fleas, lice, and bedbugs flourishing in great numbers. Mosquitoes are

rare, but flies are very common, and buildings are very poorly screened, if at all.

Hotels and eating places.—The former are fairly comfortable but are practically without exception infested with vermin. Linen, etc., is fairly clean and ample in quantity. Restaurants are of several varieties and are all licensed. All the better class ones are clean, and food is served in a most appetizing and attractive manner. The food supply is ample at present, but prices are higher than normal, and some articles are scarce. Markets and provision stores are well stocked. Salad and other garden vegetables must be either cooked or rejected, due to the practice of Chinese gardeners of using night soil for fertilizer.

Medical attention and medicines.—Inasmuch as so many physicians have been sent to the Army, medical attention is very mediocre at present. The supply of drugs and surgical stores is ample here but is scarce in the interior.

Disposal of the dead.—Almost exclusively by burial. No crematory is in operation. Laws relative to the interment of infected cadavers are very stringent and are rigidly enforced.

REPORT OF RESEARCH ON PNEUMOCOCCUS.[1]

By S. Kennison, Assistant Surgeon, United States Navy.

Fraenkel's pneumococcus causes the clinical disease of lobar pneumonia. It is a lancet-shaped diplococcus presenting a capsule upon proper staining; has no spores and is Gram positive.

There are many types of organism; the morphology of each type is identical with that of the next, staining characteristics are similar, and there is no positive method of differentiation except that of agglutination.

All types of pneumococcus are bile soluble—that is, a cloudy bouillon culture of pneumococci is readily cleared when added to ox bile because of the dissolution of the organism by the bile. They all acidify and coagulate litmus milk and ferment inulin with the production of acid. Any organism which is bile insoluble is not a pneumococcus.

The types have been divided into four groups; the first three are differentiated by agglutination tests. Type IV is not a definite type, but is a group containing all those strains of organism not agglutinated by type sera I, II, and III. This group contains a limitless number of strains.

[1] Work done in conjunction with Dr. H. S. Bernstein of Rhode Island State Board of Health.

It has wrongly been stated that Type III consists of the streptococcus mucosus, for this organism is not bile soluble. Type III is a true and distinct strain of Fraenkel's coccus.

Types I and II cause 60 per cent of all cases of pneumonia; Type III causes about 25 per cent; Type IV about 15 per cent; but these ratios vary yearly and seasonally and with different localities.

Types I and II have an average mortality of 25 to 40 per cent. Type III has a mortality of 60 to 70 per cent, varying with the virulence of the organism. This is the most fatal form of the organism. Type IV ordinarily has a virulence of mild grade and a usual mortality of 5 to 10 per cent. It is exemplified by a very mild disease usually.

It has been found that most cases at the Newport naval hospital during this spring have been of Type IV and the virulence has been very great. The reason for this is still to be determined. Whether the usual forms which are saprophytic ordinarily become virulent when the person is under low resistance or whether the organism of one person's throat inoculates the air passages of a second person by means of droplet infection and gains a new virulence on fertile soil has not yet been established.

Agglutination tests are done with serum taken from a horse after fractional inoculation with living organisms; the sputum having been first injected into the peritoneal cavity of the mouse, an emulsion of the peritoneal fluid, after 24 hours, is tested against the horse sera. There are specific sera for the first three types and the fourth type is determined by process of elimination.

Treatment.—Horse serum immunized to the organism is used in Type I infection. It is the only serum which has been of therapeutic value, having reduced mortality from 25 to 6 per cent. There is no Type III serum yet on the market nor is there serum for Type IV infection.

SUMMARY.

1. These are four types of Fraenkel's Pneumococcus. Type IV is low mortality and usually needs no treatment in particular.
2. Type III is the most fatal form.
3. Types I and II have an average mortality of 25 to 40 per cent.
4. Only Type I has been treated successfully with serum.
5. Differentiation of types by agglutination tests.
6. The curative agent in Type I is a serum, not a vaccine.
7. Type IV has been the prevalent infection at this institution and as been unusually virulent and fatal.
8. Is there a particular strain in Group IV which has caused this was it due to the saprophytic forms becoming unusually virulent the presence of low resistance?

REPORT ON MANUFACTURE OF SALVARSAN.

By the FEDERAL TRADE COMMISSION, November 27, 1917.

The Federal Trade Commission to-day entered orders for licenses to three firms to manufacture and sell the product heretofore known under the trade names of "Salvarsan," "606," "Arsenobenzol," "Arsaminol," patent rights to which have been held by German subjects. The orders for licenses are subject to acceptance and agreement by the licensees to the stipulations made by the Commission. Upon such acceptance and agreement licenses Nos. 1, 2, and 3 will be formally granted by Secretary L. L. Bracken, acting for the Commission.

Hereafter this important drug will be manufactured and sold under the name of "ARSPHENAMINE."

The Trade Commission's action was taken under section 10 of the trading with the enemy act, under direction of Commissioner Fort, upon recommendation of C. H. McDonald, Edward S. Rogers, and Francis Phelps, in charge of granting such licenses. The Public Health Service has prepared rules and standards for the manufacture and testing of "ARSPHENAMINE" and will supervise its manufacture, authority having been conferred on the Public Health Service by the Secretary of the Treasury, and the observance of the rules and standards become a condition of the license.

The three firms which will be hereby permitted to manufacture and sell "Arsphenamine" are Dermatological Research Laboratories, of Philadelphia; Takamine Laboratory (Inc.), of New York; and Farbwerke Hoechst Co. (Herman A. Metz Laboratory), of New York. The original patent for manufacture of what has heretofore been known as "Salvarsan," etc., was issued to Paul Ehrlich and Alfred Bertheim, German subjects, and assigned to Farbwerke Vormals Meister, Lucius and Bruning, of Hoechst on the Main, Germany.

Before the war began, the patented drug was sold at $4 per dose, which is approximately $3,500 per pound, and speculatively it has brought as high as $35 per dose. While the price of the product is not fixed at this time by the Commission, the right to fix prices is retained, and a price of $1 per dose to the Army and Navy, $1.25 per dose for hospitals, and $1.50 per dose for physicians are the prices at which some, at least, of the licensees have stated that they intend to offer the licensed drug.

The enormous shortage of supply of this important product will immediately be relieved and the article placed in the hands of the Government, the hospitals, and the medical profession at a price lower than ever before.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, double spacing and wide margin are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterhead, numbered paragraphs, and needless spacing between paragraphs, all of which requires correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews. For example, an article by P. A. Surg. G. Alen, U. S. N., on Removal of the Gasserian Ganglion, should be headed as follows:

Removal of the Gasserian Ganglion.
By G. Alen, Passed Assistant Surgeon, United States Navy.

If a review is submitted of an article by J E. Thompson, M. B., B. S. (Lond.), F. R. C. S. (Eng.), F. A. C. S., Galveston, Tex., Professor of Surgery, University of Texas, entitled "A Study of Modern Operations in Hypospadias from an Anatomical and Functional Standpoint," appearing in Surgery, Gynecology, and Obstetrics, Volume XXV, No. 4, October, 1917, the following heading would conform to the usage of the BULLETIN in recent years:

Thompson, J. E. Modern Operations for Hypospadias. Surg., Gynec., and Obst. October, 1917.

The author's initials are important, not so his titles. If the reviewer is not familiar with the exact abbreviation employed by the Index-Catalogue of the Surgeon General's Library and the style adopted by the American Medical Association Press, it is best to write the name of the periodical in full.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

Only the names of actual reviewers for a current number appear.

The BULLETIN prints only original articles, translations, in whole or in part, ıd reviews, and all original contributions are accepted on the assumption that ey have not appeared previously and are not to be reprinted elsewhere without ı understanding to that effect.

What is principally desired is an interesting and valuable paper, and minor rrections are cheerfully made, but the editor, naturally, desires to alter the :t as little as possible consistently with good English and a clear expression the writer's meaning. The more important the reported case, the more

brilliant the operation described, the more it behooves the writer to express himself clearly and correctly. Good style does not depend on the multiplication of adjectives and an abundance of parenthetical clauses, but on the use of the simplest and most descriptive words properly linked together in short, grammatical sentences. Accuracy and reasonable brevity usually go together and make for lucidity. It is an excellent practice to write what one has to say *currente calamo* and then to rewrite and eliminate every word which is not absolutely essential to the full exposition of the thought. A great writer and speaker once stated that his style was derived from a study of the English Bible and of Shakespeare. The King James Version of the Bible is unrivaled in our literature for simplicity and clearness, and because of that simplicity and clearness it has done more to establish a standard of English usage than any other written work in the language.

It is not to be expected that medical writers shall rival those who make literature their business, but with a little practice and patience and by rereading his manuscript in cold blood, when it has reposed in his desk for two or three days after the ardor of composition has died out, every graduate of a class A medical school should be able to compose a readable report of his investigations, operations, interesting cases, etc. A very common defect is the constant repetition of some particular word. Not long ago there came to my notice a short article of considerable intrinsic value in which the word "case" or "cases" occurred one hundred and fifty times. The writer was so full of the vital interest of his subject that by this far-from-criminal carelessness he produced a nauseating effect upon the reader. The occasional substitution for "case" of "the patient," "the sick man," "this man," "he" would scarcely have taxed his abilities unduly and the author would then have had a vehicle worthy of what he had to convey.

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This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

NOTE.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume I, No. 1, April, 1907.
Volume I, No. 2, July, 1907.
Volume II, No. 1, January, 1908.
Volume VII, No. 3, July, 1913.
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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties, with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General United States Navy.

U. S. NAVAL MEDICAL BULLETIN.

VOL. XII. APRIL, 1918. No. 2.

SPECIAL ARTICLES.

A SEARCH FOR NONPHYSICAL STANDARDS FOR NAVAL AVIATORS.

By R. P. PARSONS, Assistant Surgeon, United States Navy.

The subject of physical standards for aviators has been much discussed since our entrance into the war. Each writer upon the subject has sought to add more ideals to the already lofty set of standards. Indeed, if all the ideals that have been set forth were ever complied with by any one of our aviators one might point to him and truly say, "Behold, the perfect man!" No one but Bernard McFadden, Douglas Fairbanks and Jess Williard could qualify, and the great Guynemer, with all his nerve, would not have the boldness, were he alive, to apply for enlistment in our flying corps.

Our Navy has already rejected hundreds of applicants because of trivial minor defects, most of whom, it is safe to say, could have become successful aviators. It is a fact that a great many of these rejected men have been admitted to the Canadian Royal Flying Corps, where they have made good to an extent that would indeed be disturbing to the medical officers in our service who rejected them.

Recently the conscience of a medical officer at one of our flying camps was troubling him greatly because he had just discovered that the camp's best flyer had flat feet! He was even more perplexed upon finding that another of the camp's aviators, a man of unquestioned flying ability, had but 16/20 vision in one eye. It is difficult to imagine what his mental state would be should he learn the fact that one of Britain's greatest flyers has but 4/20 vision (uncorrected) in one eye and not a great deal more in the other.

An aspiring aviator who would enter our service, but who enjoys anything less than the established 15/15 in either ear is liable to rejection. Though no one can hear any other sound in the presence of an aeroplane motor in action, still the candidate must have fifteen-fifteenths hearing if he would be one of our aviators. It is true that the aeronaut plugs his ears tightly with cotton before a flight, to be less annoyed by the sound of his motor; but underneath the cotton he still has his fifteen-fifteenths or he would not be in our service. Last year it was discovered by a naval medical examiner at Pensacola that a certain officer with the rank of lieutenant com-

mander had subnormal hearing in both ears. In view of the officer's excellence as an aviator, a waiver was requested by the doctor in order that the officer in question might continue at his valuable air duty. It was only at the end of much debate and discussion and a voluminous correspondence covering a period of several months that the waiver was granted and the aviator permitted to continue his air duty.

Two medical officers have been known to scratch their heads and ponder for a half hour before accepting a man who was a *quarter of an inch* shy on his chest expansion. The man settled the problem for them by succeeding, after many futile attempts, in getting the expansion up to the required standard.

Let us remember that, after all, we want for the personnel of our flying corps men who can fly, or at least who can learn to fly.

By the use of our present standards only men of excellent health and having no physical defects are admitted. No one can say that, other things being equal, men who enjoy perfect health are not preferable as flying corps material to those who do not enjoy it. But the trouble is that these "other things" never are equal. That is why we see so many cases of men in perfect health who are failures as aviators. The "other things," in fact, are so extremely unequal as to account for cases like that of Stinson, who, while failing to pass the physical examination of our Army, happens to be, nevertheless, America's greatest aviator.

As we learn of more and more cases of "perfect health" men who can not learn to fly and of more and more cases of the not "perfect health" men who are becoming, or are, famous flyers, we acquire the conviction that in selecting material for our flying corps, an examination which is purely physical is far from being infallible. We become convinced also that there is a "something else," whatever it may be, that is worthy of investigation, and which should be deemed fully as important as a physical examination for use as a criterion by which men are to be selected or rejected in the recruitment of student aviators. Granting this, we are confronted with the question: "What, then, is the 'something else'?" "What are these 'other things' and how can they be assessed in examining the applicant?"

In reply, it can only be said that the answer to these questions is not known. At least, the exact value of what knowledge has already been obtained is still unknown.

In the study of this problem, the advice of the flight instructors was sought. If anyone knows flight pupils, surely the flight instructor does. If anyone can say why it is that some pupils fail and others succeed, surely it is the instructor. He it is who studies the faults of this pupil, the merits of that one. He, if any one can,

ought to know what are the qualities that comprise the making of a successful aviator.

A great number of flight instructors were asked to state what they considered the most essential qualities contributing to the making of a successful aviator.

There was a unanimous agreement on some points, a general agreement on others, and a disagreement on a few others. To summarize the points unanimously agreed upon, the successful aviator must have the following characteristics:

1. Coolness under strain.
2. Dependableness to always do the correct thing at a critical moment.
3. Mental and physical alertness.
4. Lack of any inherent fear of being in the air.
5. Persistence and perseverance in his ambition to become a successful aviator.

The points generally agreed upon were that he must be—

1. Intelligent.
2. Athletic and endowed with good muscular coordination.
3. Possessed of a keen sense of equilibrium.
4. A good judge of velocity and distances.

There was disagreement as to whether the temperamental type of extreme stolidity or that of great nervous energy was preferable, many cases being cited of men of each type who had proved their expertness as aviators. Two instructors regarded physical strength as a valuable asset, but on being questioned most of the instructors deemed it not indispensable, citing cases that clearly disproved the contention of those two instructors.

There was a notable paucity of opinions concerning qualifications which were purely physical; indeed, the question of exceptional vision was mentioned by only one instructor.

Some of them practically said, "Show us a skillful motorcyclist or automobile driver, and we will show you the making of a good aviator." It is a well-established fact that good motorcyclists and automobile drivers do invariably make good aviators. But how are we to measure a man's ability as a motorcyclist or chauffeur in the medical examining room? And, then, too, are we not going astray in our interpretation of cause and effect in thinking that it was the motorcycling or automobiling ability that produced the flying ability, instead of analyzing the proposition to the conclusion that the same factors which were responsible for making the man a skillful motorcyclist were responsible also for making him a skillful aviator?

It is these "factors," these "other things," this "something else" spoken of before, that we are in search of, and which, perhaps may

be found, in part at least, in the summarized opinions of the instructors.

The one way of determining the value of these opinions is to measure these qualities in the aviation students, if possible, and then to determine what the correlation is between these measurements and the flying ability of the men measured.

An attempt is being made to devise means of measuring the qualities that the instructors tell us are important. Tests which are designed to measure these qualities have already been conducted on 250 students at the naval aviation ground school.

Of the 250 men tested, 74 had been under instruction at Pensacola and Hampton Roads and had done enough solo flying for their instuctors to form definite opinions regarding their ability as flyers.

Before comparing the test performances of these 74 men with their actual flying ability something should be said about the tests. All the tests were conducted in exactly the same way, and under precisely the same conditions for each man, though some of the men, for various reasons, were not given all of the tests.

The technical details of the tests, being both tedious and of a more or less confidential nature, must necessarily be omitted. Most of them were made possible by the work of Dr. L. E. Troland and Dr. H. E. Burtt, of the Harvard Psychological Laboratory, who suggested their use and devised the apparatus for conducting them.

Test No. 1 is designed to measure a man's composure, "coolness" or presence of mind; or better, the extent to which he "keeps his head" under a condition which is very capable of producing emotion. During the procedure the subject is doing as rapidly as possible an arithmetical test which involves the addition of several sets of figures. The time required for his addition of each figure is automatically recorded in tenths of seconds. Simultaneously a graphic record is being made of his pulse and respiration. At some point in the course of the test, the stimulus referred to is introduced. The test completed, the difference in the average time for each addition before and each addition after the introduction of the stimulus is computed. The time elapsing after its introduction, before the subject returns to his previous rate of addition, is also computed. The exact changes that the shape, rate and rhythm of the pulse and respiration suffered after the introduction of the stimulus are carefully measured, as well as the time elapsing after its introduction, before the subject returns to his previous state as regards pulse and respiration.

Test No. 2 is a measure of a man's alertness. This is done by the well-known methods of reaction time measurements. Several measurements are made of the subject's visual, auditory, and tactual reaction times, the average for each being recorded separately.

Test No. 1.—Measurements of emotion.

Test No. 8.—Equilibrium reaction time.

Test No. 2.—Reaction time measurements.

Test No. 5.—Measurement of judgment of distances and velocity.

Test No. 10.—Troland-Pressy machine measurements of intelligence and learning rate.

Test No. 3 is a measurement of muscular coordination. The subject executes a certain movement, involving the use of a certain set of muscles, as rapidly as possible. Each execution being recorded graphically, the rate and regularity of the movements can be computed.

Test No. 4 was designed for the purpose of measuring to some extent a candidate's mental alertness. It consists in the measurement in tenths of seconds of the time required by the subject to read a set of words with reversed spelling, the time for each word being recorded, and the number of mistakes noted.

Test No. 5 is designed to measure judgments of distances and velocity and the correlation of the two. The candidate watches an object which traverses at a constant speed the length of a long screen, at a part of which is a gap. He is instructed, before being tested, to stop the object when it has reached a distance beyond the gap equal to the length of the gap. The subject can stop the object instantly by pressing a telegraph key which he holds in his hand. This test measures his judgment of just how long the gap is, how fast the object is traveling and his correlation of the two. Several trials are made, his error in centimeters being recorded in each case. A meter stick hangs on the wall above the gap whose ends do not coincide with the edges of the gap. The subject now has several trials at stopping the object at a distance beyond the gap equal to the length of the stick. His error on each trial is recorded. The purpose of this part of the test is to determine whether the subject considers the length of the meter stick the same as that of the gap, the latter being, in fact, somewhat longer. In the third part of the test he attempts to stop the object directly behind a point marked in front of the screen, the point being about two meters beyond the gap. After each trial in the third part of the test, the subject is informed of his error, that his success in correcting his faulty tendencies may be measured. The average error for all trials is computed.

Test No. 6 is used to measure the power of observation. This has less relation to actual flying than it has to the other work that is required of a naval aviator. However, one who is a careful observer is more apt to be the kind who will learn to fly quickly than one would be who does not observe carefully. The nature of this test is such that its employment determines whether the subject is or is not of the type that always tries to do the best he can. The subject is given one minute to look at a distant scene which appears within a circle. He then sketches upon a paper circle the objects he saw. He is now shown for two minutes another distant scene which lies within another circle. A half hour later (after having gone through the other tests) he sketches the second scene upon another

paper circle. In grading the pictures the artistic element is entirely disregarded, attention being given only to the accuracy with which the objects have been placed in their relation to each other, and to the number of objects correctly included in the sketch.

Test No. 7 is used to detect, if possible, the existence of any unusual fear of flying. One hundred words are read to the subject. Fifty of these words pertain to aviation and its attendant dangers; the other 50 have no connection with the subject of aviation. The 100 words are shuffled, so that those of the two kinds do not follow each other in any regular order. For each word the subject is to respond with the first thought that enters his mind. The time elapsing between the reading of the word and the subject's response is recorded in fifths of seconds. The test completed, the total response time for one set of 50 words is compared to the total response time for the 50 words of the other set. The nature of the responses is also analyzed.

Test No. 8 is an equilibrium reaction time measurement. The subject sits in a chair placed upon a platform which can be made to tip to the right or to the left. The subject holds in each hand a telegraph key. He is instructed to press the key on the side toward which he is tipped the moment he knows which side he is being tipped to. The moment the platform starts to tip an electric circuit is opened and the moment he presses the correct key the circuit is closed. The time elapsing between the opening and closing of the circuit is measured by a chronoscopic device by means of which the average reaction time may be computed in thousandths of seconds. In connection with this test, it is of interest to note its correlation with results obtained by the Bárány chair test. Apparently there is no correlation whatever between the two. Repeated cases who have shown no nystagmus reaction or past pointing to the Bárány tests have shown without exception a perfectly normal or better than normal equilibrium reaction time. This should demonstrate conclusively the fault of the Bárány test. It was intended for clinical diagnostic use and not for use in recruiting aviators. It serves the purpose of the former, but emphatically does not serve that of the latter.

As far as equilibrium is concerned, all that we should demand of an aviator is that he perceive the changes being made in the planes occupied by the axes of his machine and that he react properly and quickly enough to these changes. It can now be said with the utmost emphasis that the Bárány chair does not test this function. It should matter little what the conditions of a man's labyrinth is or how long his nystagmus lasts, or does not last, provided he has a sense of equilibrium. There are so many excellent fliers who react improperly or not at all to the Bárány test that whatever is said in support of its value as a recruiting instrument ought not now to be

taken seriously. The test here described does determine whether the man can perceive a tip, whether he perceives correctly the direction of the tip, and how long it takes him to react properly to the tip. Whether it will prove to be of value in recruiting aviators remains to be seen. It was not in use before the group of 74 men in question were transferred from the ground school. Those who have been tested by it have not yet done enough flying to demonstrate its value or its worthlessness.

Test No. 9 is merely an ergographic tracing. It has been used with the hope that it would give some clew to the amount of persistence or perseverance, or better the "stick-to-itiveness," that one possesses.

The curves vary widely with different men, some producing a curve falling gradually and uniformly with the increasing muscular fatigue, which shows that they have done the best they could as long as they could, while others produce an erratically rising and falling curve showing perhaps their tendency to undue discouragement or a lack of great persistence.

Test No. 10 is an intelligence test. It is done with the Troland-Pressy machine which was designed for use in intelligence measurements. In operating it the subject must learn a set of combinations or sequences to be followed in the pressing of two keys, which if correctly followed will result in his lighting an incandescent lamp each time he presses a key. His errors are counted automatically and noted, together with the time spent on each trial, there being the same number of successful presses before each trial is completed. By noting his time and number of errors for each trial his rate of improvement and accordingly his rapidity in learning are determined, which should express, in some measure, his intelligence.

At the time of this writing it is impossible to give the comparison with flying records on tests 5, 8, 9, and 10 for the reason that they have but lately been ready for use and the men tested with them have not yet been transferred from the ground school to the flying camps, or have not done a sufficient amount of flying.

From information derived from the reports made by the flying instructors the pupils have been grouped into three classes, as follows: (1) Those that have demonstrated marked ability as fliers; (2) those of average ability; (3) those that have shown very poor ability or have been regarded as failures by their instructors.

The report filled out by the flight instructors has the form shown:

FLYING REPORT.

Name_____ Date_____

Total flying time to date of report____ _____minutes.
Time on dual before first solo_____ _____minutes.

REPORT BY STUDENT'S DUAL INSTRUCTOR.

Name of instructor_____

Student as learner_____ ( ) Fast. ( ) Average. ( ) Slow.

Flying aptitude on completing dual_____ ( ) Good. ( ) Average. ( ) Poor.

Temperament_____ ( ) Cool. ( ) Average. ( ) Nervous. ( ) Easily discouraged.

Judgment at critical moments_____ ( ) Good. ( ) Average. ( ) Poor.

Sense of balance and direction_____ ( ) Good. ( ) Average. ( ) Poor.

Tendency on turns_____ ( ) Too flat. ( ) Over bank. ( ) Average. ( ) Irregular.

Judgment on landings_____ ( ) Good. ( ) Average. ( ) Poor.

Control_____ ( ) Delicate. ( ) Stiff.

REPORT OF DIVISION COMMANDER (JUDGING ESPECIALLY BY SOLO PERFORMANCE).

Responsible for damage to machine_____ ( ) Slight. ( ) Severe. ( ) Total wreck.

Effect on pupil of crash or scare_____ ( ) Negligible. ( ) Pronounced.

Student_____ ( ) Appears to enjoy flying. ( ) Rather indifferent to flying. ( ) Sticks to it though flying appears distasteful.

Remarks:

_____

_____

_____

_____,

Squadron Commander.

The following table shows the test performances of all men in the group who have proved to be excellent flyers. It is to be noted that some of the items are left blank. This is a result of technical difficulties which arose from time to time, preventing the completion of all the tests in the cases of some of the men.

In test 6, the pictures were graded A, B, or C according to accuracy, grade A representing the most accurate.

In test 7, 0 represents no evidence of fear of flying, + represents fear, and ± represents doubtful cases.

Table I.

Group I.	Test 1.					Test 2.				Test 3.	Test 4.	Test 5.	Test 6.		Test 7.
	Change in average rate of addition (seconds).	Time to previous rate (seconds).	Change in respiratory rate.	Time to previous rate.	Distortion.	Change in pulse rate.	Average visual reaction time.	Average auditory reaction time.	Average tactual reaction time.	Coordination, rate per minute.	Average time for reversed words—Number of mistakes.	Average error in centimeters.	Picture I.	Picture II.	Fear of flying.
NAME.															
O. T.	1.13	0	6.6	4.3	0	...	0.192	0.131	0.150	360	0.70 0	...	B	A	0
E. B. S.	0.39	3.2	0	0	0	6	.344	.434	.204	306	.55 0	...	C	B	0
E. P.	0.59	3.4	0	0	0	14	.280	.230	.185	327	.20 0	...	C	C	0
R. S. A.	.....	...	...	...	...	...	.219	.149	.270	...	.....	...	...	...	...
L. J. B.	0.66	1.5	6.8	3.3	0	6	.274	.240	.250	330	.22 2	...	C	C	0
N. M. K.	0.62	0	0	0	0	12	.340	.264	.164	278	1.61 0	...	A	A	+
K. B. O.	0.15	0	3	5.6	+	4	.188	.124	.124	352	.14 0	...	A	B	0
R. A. B.	0.96	0	0	0	0	...	.211	.223	.204	255	.....	...	...	...	0
L. L.	0.21	0	0	0	0	0	.181	.222	.193	268	1.4 0	...	A	B	0
F. B.	0.66	4.3	9	4.3	+	6	.284	.128	.142	350	.....	...	A	A	0
O. E. L.	0.67	0	6	3.3	+	12	.145	.124	.136	370	.91 0	...	B	B	+
J. L. D.	1.03	2.0	0.6	3.3	0	12	.282	.210	.184	....	.8 2	...	...	...	±
W. K. B.	−0.72	0	0	0	+	6	.304	.292	.240	....	1.0 0	...	C	C	0
E. M. C.	−2.08	0	0	0	+	8	.200	.122	.195	....	.....	...	...	...	...
J. C. N.	0.39	4.9	0	0	0	6	.180	.112	.195	334	.66 1	...	A	A	0
P. H. P.	−0.50	0	3	5.1	0	2	.348	.280	.268	285	1.1 0	...	A	C	0
C. H. S.	0.92	0	0	0	0	8	.176	.201	.102	321	1.66 1	...	C	C	0
E. B. L.	0.88	6.8	0	0	0	12	.208	.165	.176	288	1.8 1	...	B	C	0
G. G.	−1.59	0	3	5.3	0	10	.308	.228	.204	348	1.1 0	...	A	A	±
W. H. G.	0.28	4.5	0	0	0	8	.325	.253	.165	360	1.36 0	...	C	A	±
I. P.	0.76	0	0	0	+	6	.196	.164	.108	168	1.22 1	...	...	...	0
H. N. S.	0.21	0	0	0	0	6	.220	.176	.156	420	.4 2	...	B	A	0
Z. H. P.	0.01	0	0	0	0	4	.221	.132	.232	293	.65 1	...	C	C	0

The following table shows the test performances of all men in the group who have proved to be very poor flyers, or failures, or extremely slow in learning to fly:

Table II.

Group III.	Test 1.					Test 2.				Test 3.	Test 4.	Test 5.	Test 6.		Test 7.
	Change in average rate of addition (seconds).	Time to previous rate (seconds).	Change in respiratory rate.	Time to previous rate.	Distortion.	Change in pulse rate.	Average visual reaction time.	Average auditory reaction time.	Average tactual reaction time.	Coordination, rate per minute.	Average time for reversed words—Number of mistakes.	Average error in centimeters.	Picture I.	Picture II.	Fear of flying.
NAME.															
J. L. G.	1.79	10.5	0.6	6.0	0	6	.340	.270	.216	400	1.66 / 1	...	C	C	+
W. H.	.45	5.0	3	1.0	+	6	.236	.173	.180	268	1.06 / 1	...	C	A	0
C. B. D.	2.66	11.4	2.0	5.6	+	6	.243	.241	.206	435	.26 / 2	...	...	...	±
H. A. M.	0.1	0	3	2.6	0	16	.247	.204	.242	310	...	...	...	...	+
E. H.	1.62	9.2	2	4.3	+	12	.146	.113	.135	325	.25 / 0	...	B	A	+
E. J. B.	...	...	...	...	...	...	.240	.235	.233	288	...	...	...	...	...
R. C. C.	3.10	5.8	18	1.7	+	28	.193	.142	.195	451	...	...	...	...	+
C. N.	2.1	.8	6	1.2	+	24	.304	.316	.208	347	.05 / 4	...	C	B	+
G. L. R.	2.53	6.7	10.2	5.4	+	10	.191	.273	.226	335	...	...	...	...	...
F. C. S.	.35	4.1	3.0	5.6	0	24	.252	.227	.230	327	2.12 / 0	...	C	C	+
P. E. S.	.88	3.6	4.4	3.8	+	12	.224	.220	.164	300	.11 / 0	...	...	...	0

Table III is derived from the data in Table I. It gives the distribution of men in Group I (best flyers) according to their test scores. Arbitrary limits in the test scores have been used for this distribution into the three classes for every test.

It is noted that 63 per cent of all men in Group I made good scores in test 1 and that zero per cent made poor scores. Tests 3, 4 and 6 show a negative correlation with flying ability, evidencing their lack of value as they have been used.

Table III.

Group I, 23 men.	Number good in tests.	Per cent good.	Number average in tests.	Per cent average.	Number poor in tests.	Per cent poor.
Test No. 1	14	63	8	37	0	0
Test No. 2	12	52	5	22	6	26
Test No. 3	6	31	6	31	7	38
Test No. 4	2	10	8	42	9	48
Test No. 6	4	22	14	50	5	28
Test No. 7	16	76	3	14	2	10

Table IV gives the distribution of men in Group II (average flyers) according to their test scores.

Table IV.

Group II, 40 men.	Number good in tests.	Per cent good.	Number average in tests.	Per cent average.	Number poor in tests.	Per cent poor.
Test No. 1	15	37	18	46	7	17
Test No. 2	23	57	12	30	5	13
Test No. 3	12	33	15	42	9	25
Test No. 4	10	32	14	46	7	22
Test No. 6	11	33	16	47	7	20
Test No. 7	12	40	13	50	3	10

Table V is derived from the data in Table II. It gives the distribution of men in Group III (poorest flyers) according to their test scores.

Here again may be noted the close correlation shown by test 1. Only one man in Group III made a good score on this test. Test 2 is seen to be more disappointing here than in Table III. Test 6 seems here to be more valuable than it does in Table III, and test 7 corroborates the testimony given in Table III.

Table V.

Group III, 11 men.	Number good in tests.	Per cent good.	Number average in tests.	Per cent average.	Number poor in tests.	Per cent poor.
Test No. 1	1	10	0	0	9	90
Test No. 2	3	27	6	54	2	19
Test No. 3	3	27	6	54	2	19
Test No. 4	2	28	0	0	5	72
Test No. 6	0	0	3	60	2	40
Test No. 7	2	22	1	12	6	66

In Table VI the 25 men standing highest on each test are distributed according to their flying ability, the per cent of the total number of 25 being given for each of the three groups, in the case of each test.

In Table VII the 25 men standing lowest on each test are distributed as in Table VI.

Table VI.

Best 25 men in tests No.—	Number good flyers.	Per cent good.	Number average flyers.	Per cent average.	Number poor flyers.	Per cent poor.
1	13	52	11	44	1	4
2	11	44	13	52	1	4
3	7	28	14	56	4	16
4	9	36	12	48	4	16
6	9	36	16	64	0	0
7	13	52	6	24	3	12

Table VII.

Worst 25 men in tests No.—	Number good flyers.	Per cent good.	Number average flyers.	Per cent average.	Number poor flyers.	Per cent poor.
1	0	0	17	68	8	32
2	3	12	15	60	7	28
3	6	24	16	64	3	12
4	5	20	17	68	3	12
6	6	24	16	64	3	12
7	5	20	13	52	7	28

Of course, a study based upon only 74 men can not be of much value but, on the basis of the figures derived from this study, let us see how the use of these tests will affect the efficiency of our naval flying corps.

Of the 74 men in question, 23 (31 per cent) are aviators of excellent ability; 40 (54 per cent) are aviators of average ability, and 11 (15 per cent) have been considered very poor flyers or failures.

By the use of test 1, in accepting 74 students, by rejecting all men whose scores fell in the lower third of the three-score levels, it may be seen by Table V that 90 per cent of the poor flyers would be eliminated; by Table IV that 17 per cent of the average flyers would be eliminated, and by Table III that 0 per cent of the good flyers would be eliminated. Twenty-one per cent of all men applying would be eliminated. Therefore, it would require 93 applicants to supply the quota of 74 qualified men. Assuming that of all healthy men who want to become aviators, 31 per cent will become excellent aviators, 54 per cent aviators of average ability, and 15 per cent failures; of

the 93 men, 29 would be excellent material, 50 would be average material, and 14 poor material. Since none of the excellent material would be rejected, 29 excellent men would be accepted; 17 per cent of the 50 average men would be rejected, leaving 42 such men; 90 per cent of the 14 poor men would be rejected, leaving 2 such men.

The table below shows the difference in the ratio of the three classes to each other that would be affected by the use of the test as proposed:

	Number excellent.	Per cent.	Number average.	Per cent.	Number poor.	Per cent.
Without test.....	23	31	40	54	11	15
With test.....	29	39	42	57	2	3

On the basis of this study test 2 would be of no benefit since by its use more good men than poor men would be rejected. In this connection, it may be stated that the test has lately been modified to include only visual reactions and has been changed from a simple reaction time measurement to a choice reaction time measurement. This modification has been made with the hope that it will now produce more encouraging figures.

Test 3 appears to be of no value whatever.

By the use of test 4, 72 per cent of the poor flyers and 48 per cent of the good flyers would be eliminated. But since the good flyers outnumber the poor flyers two to one, there would be an equal number of both classes eliminated. Approximately the same condition holds for test 6.

The evidence seems to indicate a definite value for test 7. By rejecting all men showing a definite fear of the air, on the basis of this test, the ratio of the sizes of the three classes to each other would be made distinctly more desirable. Since 18 per cent of all men would be eliminated by this test, 90 men would be required to make up the quota of 74. Of the 90 men 27 would be excellent material, 49 average material and 14 poor material. Ten per cent of the good men would be rejected, leaving 24; 10 per cent of the average men would be rejected, leaving 45; 66 per cent of the poor men would be rejected, leaving 5.

The ratio change brought about would be thus:

	Number excellent.	Per cent.	Number average.	Per cent.	Number poor.	Per cent.
Without test.....	23	31	40	54	11	15
With test.....	24	33	45	60	5	7

It ought not to be hoped, even, that any test or set of tests will ever be developed to a degree of perfection that will detect invariably poor aviation material. Nevertheless, I do believe that from the value already demonstrated in test 7, and especially in test 1, that tests can be devised which if used properly will result in a distinct improvement in the efficiency of our flying corps.

Results have not yet come in from the flying camps to compare with tests 5, 8, 9, and 10.

In the meantime, tests 3, 4, and 6 being abandoned, more attention can be paid to the improvement of technique in tests 1 and 7 and the modification mentioned for test 2.

No one test will ever suffice, since one test can only measure one function, and certainly there is a complexity of functions involved in the making of a successful aviator.

So little flying was being done in this country before our entrance into the war, that we looked upon the aviator as a rare curiosity, a superhuman being, some one to be held in awe and reverence. We thought that to become a successful aeronaut was something that could be attained only by the one in a thousand, the true hero, endowed with almost miraculous skill and daring. It was because this view was generally held, perhaps, that we adopted such a high set of physical standards in our selection of aviation candidates.

Experience has taught us, however, that almost any young man with a reasonable amount of common sense, the usual amount of "nerve" possessed by most young Americans, and a keen desire to be an aviator, can realize his ambitions and learn to be a perfectly good flyer in a very few hours.

It is indeed questionable whether a great deal more actual skill is required in learning to fly than in learning to drive an automobile. We are coming to believe that, after all, the most important quality that determines one's success as a flyer is that of "nerve." Everyone realizes that flying is a dangerous occupation. The flight pupils realize this as much as anyone does, and those that can best forget it, and can feel perfectly at ease in the aeroplane are invariably the ones who learn the quickest and who become most successful.

The results obtained by these tests bear out thoroughly the truth of these contentions. The test which proved to be most valuable is the one that measures composure under exciting influences. The next best test is the one that often detects a tendency to fear of the air. I firmly believe that the technique can be perfected in both of these tests to an extent that will make them even more valuable than they already have shown themselves to be. The blood pressure is known to be the most reliable index of the extent of emotion, but as yet no means have been devised for giving us an accurate and continuous record of blood-pressure changes. The height of the pulse tracings.

however, gives us a rough idea of its changes. The changes in pulse rate are, too, a valuable index, and undoubtedly the concentration of thought is also. This last, it was shown in the description of test 1, can be quite simply and probably very reliably measured.

There is great room for improvement in test 7. The selection of the words was made after a perusal of the entire dictionary. During this task it is quite probable that many words were overlooked which would suit the purpose much better than some that were selected. There is a great chance for error in this test in the analysis of the responses. Only after the experience obtained by the analysis of hundreds of sets of responses should the examiner place much confidence in the conclusions he comes to through the use of this test. Below are given the responses, with the time for each, of two typical cases. Those given in set 1 were by a student who became a good flyer. Those given in set 2 were by a student who was given up by his instructors as a hopeless case. It is noted that in set 1 the time for the responses to the aviation words does not total greater than that for the nonaviation words. In set 2 the time for the aviation words totals 17.6 seconds more than for the nonaviation words. The difference in the nature of the responses in the two sets is self-evident.

Set I.

	Suggestion.	Response.	Time.		Suggestion.	Response.	Time.
1	Cabbage	Stew	2.1	51	*Break*	Glass	2.0
2	*Wing*	Bird	1.0	52	*Scare*	Up	1.2
3	*Death*	Murder	1.1	53	Candy	Kid	1.3
4	Fancy	Full	1.8	54	Queen	Lady	1.8
5	Coffee	Tea	2.0	55	*Frighten*	Scared	1.2
6	*Reckless*	Driver	1.9	56	*Fear*	Fright	1.1
7	*Jump*	Over	1.2	57	Daughter	Son	1.4
8	Garden	Flowers	1.3	58	Ham	Eggs	1.8
9	Kitchen	Canary	1.5	59	*Careless*	Useless	1.7
10	*Earth*	Round	1.3	60	*Propeller*	Blade	1.0
11	*Trouble*	Sick	1.2	61	Index	Finger	2.0
12	Permit	Me	1.8	62	Animal	Elephant	1.5
13	Paper	White	2.0	63	*Landing*	Made	1.5
14	*Danger*	Break	2.0	64	*Upside down*	Upside up	2.1
15	*Drop*	Down	1.8	65	Fat	Lean	2.2
16	Grammar	School	2.1	66	Girl	Sweetheart	2.8
17	Janitor	Furnace	3.0	67	*Immediate*	At once	1.0
18	*Fall*	Winter	3.8	68	*Control*	Airship	1.2
19	*Smash*	Up	1.1	69	Absorb	Water	1.3
20	Weed	Flower	1.1	70	Include	Exclude	2.1
21	Dinner	Supper	1.3	71	*Afraid*	Scared	1.0
22	*Kill*	Dead	0.8	72	*Flying*	Straight	1.2
23	*Life*	Live	1.0	73	Label	Cover	1.8
24	Elephant	Animal	2.2	74	*High*	Low	1.3
25	Orange	Fruit	1.3	75	*Die*	Dead	1.2
26	*Fog*	Dark	1.8	76	Eat	Food	1.0
27	*Turnover*	In bed	1.1	77	Tennis	Ball	0.9
28	Tube	Stone	2.3	78	Height	Low	0.5
29	Lady	Love	1.5	79	*Aeroplane*	Fly	1.3
30	*Ground*	Hard	1.4	80	*Attack*	Defense	1.1
31	*Insecure*	Unsafe	1.6	81	Shoe	Wear	1.3
32	Table	Round	1.9	82	Basket	Eggs	1.6
33	Thread	White	1.8	83	*Drown*	Water	1.4
34	*Loose*	Watch	1.7	84	*Dizzy*	Whirl	1.2
35	*Fly*	Air	1.5	85	Pencil	Paper	2.0
36	Cigar	Smoke	3.2	86	Bread	White	1.6
37	Oyster	Clam	2.0	87	*Stop*	Listen	1.4
38	*Lose*	Money	1.4	88	*Cloud*	Rain	1.1
39	*Motor*	Car	1.0	89	Beans	Grow	2.3
40	Napkin	Ring	2.1	90	Waldorf	Eat	1.6
41	Hair	Tonic	1.3	91	*Careful*	Lookout	1.8
42	*Crash*	Smash	1.2	92	*Spill*	Milk	2.0
43	*Balance*	Lose	2.1	93	Paste	Glue	2.5
44	Jewel	Lose	3.0	94	Beer	Drink	1.5
45	Baby	Young	1.4	95	*Altitude*	Height	1.2
46	*Tip*	Over	0.9	96	*Worry*	Care	0.8
47	*Quick*	Slow	1.3	97	Stove	Heat	1.4
48	Odor	Smell	1.0	98	Cloth	White	1.7
49	Umpire	Ball game	1.8	99	*Daring*	Afraid	2.4
50	Horse	Cow	2.2	100	Overcoat	Wear	1.0

Total time for aviation words..... 70.2 seconds.
Total time for other words..... 91.2 seconds.

Minus..... 21.0 seconds.

Set II.

	Suggestion.	Response.	Time.		Suggestion.	Response.	Time.
1	Cabbage	Lettuce	1.4	51	*Break*	Smash	1.6
2	*Wing*	Bird	1.3	52	*Scare*	Fear	1.1
3	*Death*	Bury	1.5	53	Candy	Soda	1.2
4	Fancy	Free	1.1	54	Queen	May	1.0
5	Coffee	Chocolate	1.2	55	*Frighten*	Scare	1.3
6	*Reckless*	Daring	1.6	56	*Fear*	Death	1.7
7	*Jump*	Back	1.2	57	Daughter	Son	1.1
8	Garden	Walk	3.0	58	Ham	Eggs	1.4
9	Kitchen	Stove	1.0	59	*Careless*	Reckless	1.2
10	*Earth*	Ground	1.1	60	*Propeller*	Blade	1.4
11	*Trouble*	Care	1.9	61	Index	Inventory	2.1
12	Permit	Allow	1.2	62	Animal	Creature	1.1
13	Paper	Pencil	1.0	63	*Landing*	Water	1.0
14	*Danger*	Death	1.1	64	*Upside down*	Loop	2.1
15	*Drop*	Back	1.0	65	Fat	Thin	1.0
16	Grammar	School	1.0	66	Girl	Woman	1.2
17	Janitor	Housekeeper	2.4	67	*Immediate*	At once	1.4
18	*Fall*	Forward	2.4	68	*Control*	Rudder	1.3
19	*Smash*	Nose-dive	2.0	69	Absorb	Absorbent	1.4
20	Weed	Vegetable	1.2	70	Include	Conclude	1.2
21	Dinner	Supper	1.1	71	*Afraid*	Fear	1.2
22	*Kill*	Drop	1.4	72	*Flying*	Brave	1.1
23	*Life*	Death	2.0	73	Label	Ticket	1.0
24	Elephant	Rhinoceros	1.2	74	*High*	Low	1.8
25	Orange	Lemon	1.0	75	*Die*	Death	2.0
26	*Fog*	Mist	1.3	76	Eat	Thin	1.1
27	*Turnover*	Fall down	2.4	77	Tennis	Golf	1.3
28	Tube	Pipe	1.0	78	*Height*	Depth	1.0
29	Lady	Man	1.2	79	*Aeroplane*	Flying boat	2.1
30	*Ground*	Sail	1.1	80	*Attack*	Fierce	1.4
31	*Insecure*	Secure	1.4	81	Shoe	Foot	1.0
32	Table	Leg	1.1	82	Basket	Ball	1.1
33	Thread	Silk	2.0	83	*Drown*	Swim	1.0
34	*Loose*	Tight	1.6	84	*Dizzy*	Brave	1.1
35	*Fly*	Fall	2.2	85	Pencil	Pen	1.0
36	Cigar	Cigarette	1.0	86	Bread	Eat	1.1
37	Oyster	Cocktail	1.2	87	*Stop*	Quick	1.4
38	*Lose*	Find	1.0	88	*Cloud*	Roll	1.2
39	*Motor*	Aeroplane	1.4	89	Beans	Peas	1.1
40	Napkin	Tablecloth	1.2	90	Waldorf	Astoria	1.0
41	Hair	Breadth	1.0	91	*Careful*	Reckless	1.8
42	*Crash*	Fall	1.0	92	*Spill*	Fall	1.4
43	*Balance*	Fall	1.0	93	Paste	Glue	1.2
44	Jewel	Ruby	1.4	94	Beer	Ale	1.0
45	Baby	Boy	1.1	95	*Altitude*	High	3.1
46	*Tip*	Over	3.2	96	*Worry*	Reckless	1.0
47	*Quick*	Slow	1.4	97	Stove	Pipe	1.0
48	Odor	Smell	1.0	98	Cloth	Table	1.1
49	Umpire	Baseball	1.1	99	*Daring*	Brave	2.0
50	Horse	Run	1.0	100	Overcoat	Hat	1.0

Total time for aviation words ..... 78.4 seconds.
Total time for other words ..... 60.8 seconds.

Plus ..... 17.6 seconds.

In conclusion, I believe that more medical officers should be working on this problem. It is certainly a new field of research and one that offers a world of work for anyone who cares to investigate it.

What has been done already is merely a beginning in the attack on the problem before us and has yielded us a few very valuable clues to work on.

The pendulum at present is situated on the crest of the physical side of the problem, much to the detriment of our flying corps. It would indeed be equally unfortunate should the pendulum swing to the crests of the things that have been treated here. These tests, as soon as we have standardized those of proven value, should be used to supplement physical examinations.

Our physical standards should be lowered. The aviator's job is an ideal one for the flat-footed man, for where would he have to do less walking? Aviation is an ideal field for the deaf and the near-deaf man, for where would he have to do less hearing? A half inch difference in chest expansion will not decide the fate of the ambitious aviation student, nor will a difference of 2/20 or 10/20 in vision.

The physical standards for our aviators should, of course, be as high as those for other branches of the service, but no higher; in fact, as has been pointed out, there are several defects which, while constituting a definite handicap to a man in other branches of the service, would affect in no way his ability as an aviator.

PLATES ILLUSTRATING THE PATHOLOGICAL EFFECTS PRODUCED BY SOME OF THE BETTER KNOWN POISON GASES USED BY THE GERMANS.[1]

Prepared under the direction of the Bureau of Medicine and Surgery
By Assistant Surgeon G. M. MACKENZIE, U. S. N. R. F.,
Bureau of Mines Experiment Station,
Washington, D. C.

[1] Valuable work on the effects of chlorine and other gases employed by the Germans is being done by Prof. Yandell Henderson, of Yale, and his associates. The results of his researches being extremely confidential, no printed report can be expected before the end of the war. Medical officers of the Army and Navy interested in this subject should apply to Dr. Henderson for information, as he has expressed the greatest eagerness to render them every assistance.

PLATE I.

Edema of lungs, emphysema and serous exudate and froth in trachea of a dog exposed for 80 minutes to a 0.59 milligram-liter concentration of superpalite, death occurring in 72 hours. The appearances are typical of those produced by chlorine, phosgene, and other exciters of lung edema.

PLATE II.

A. Interior of left ventricle of a dog dying 23 hours after 30-minute exposure to a 0.21 milligram-liter concentration of superpalite. Subendocardial hemorrhages are shown.

B. Section of liver of a dog dying 20 hours after 30-minute exposure to a 200 parts–1,000,000 (by volume) concentration of arsine. Well-marked jaundice.

A
B

B

PLATE III.

A. Trachea and larynx of a dog dying 48 hours after 30-minute exposure to a 0.13 milligram-liter concentration of dichlorethylsulphide ("Mustard gas"). Congestion and edema of glottis and epiglottis and acute membranous tracheitis are beautifully shown.

B. Section of lung of a dog with atelectasis and patches of focal pneumonia following 30-minute exposure to 0.056 milligram-liter concentration of dichlorethylsulphide. Death occurred 72 hours after gassing.

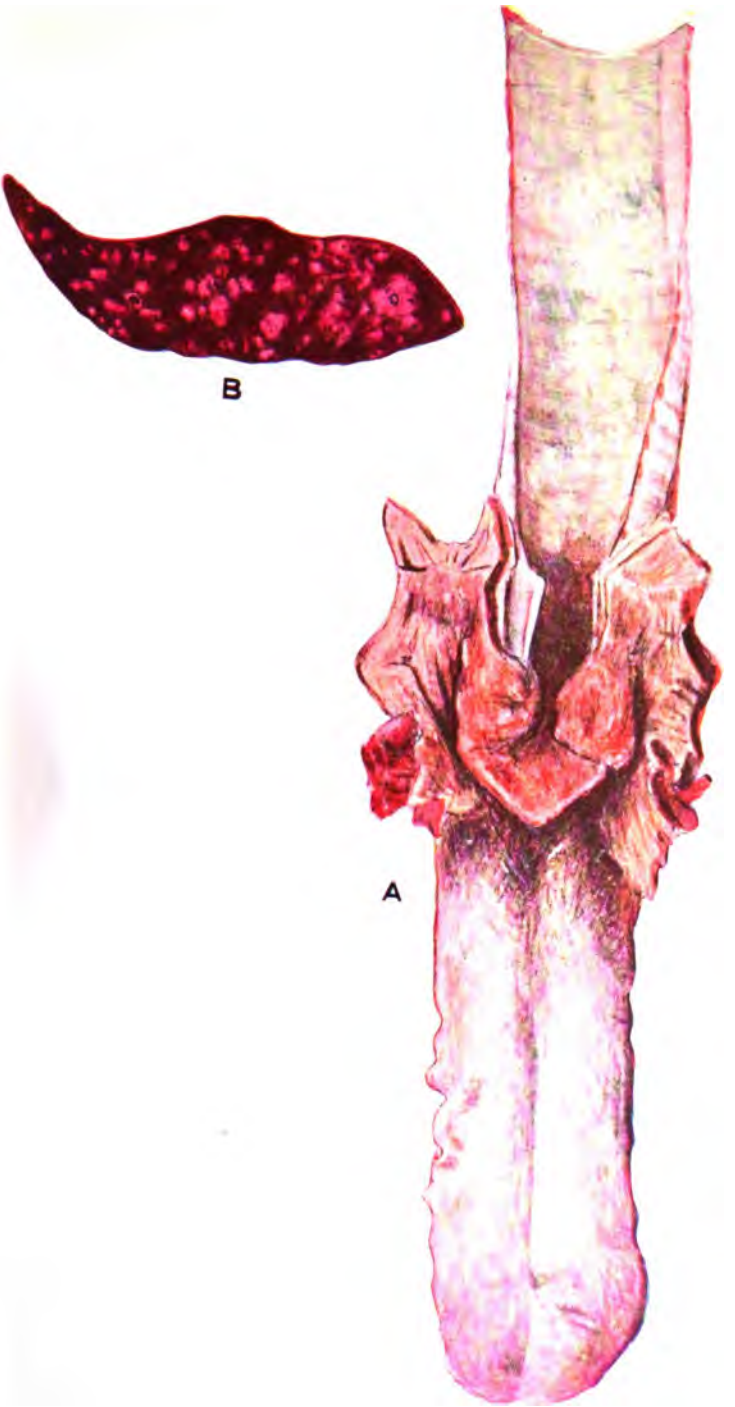
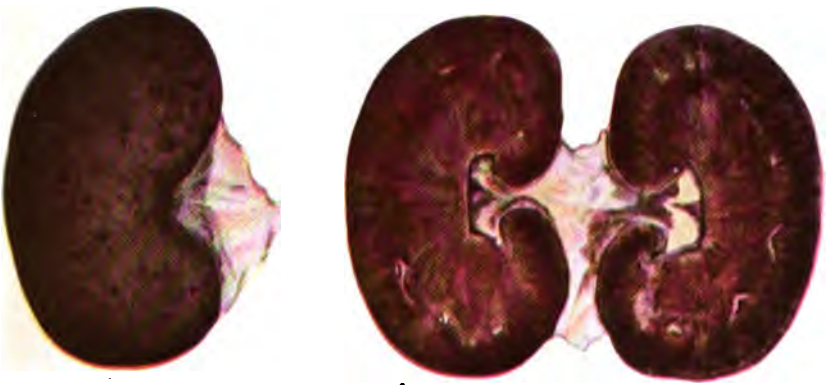

B
A

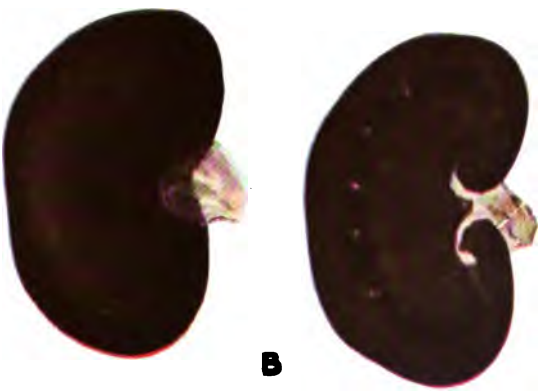
PLATE IV.

A. External surface and section of kidney of a dog dying 20 hours after 30-minute exposures to 200 parts—1,000,000 (by volume) concentration of arsine. The staining is due to methemoglobin, which appears both in the cut section and on the external surface from which the capsule has been stripped. Hemorrhages and swelling of the cortex are also noticeable.

B. The staining is also by methemoglobin and is much more intense, due to a higher concentration of the gas, arsine, 800 parts—1,000,000 (by volume). Death occurred 2 hours sooner than in the case of *A*.



A



B

PLATE V.

A. Trachea and lung of a dog dying 48 hours after 30-minute exposure to 0.27 milligram-liter concentration of dichlorethylsulphide. Membranous tracheitis and complete atelectasis of middle lobe are conspicuous. Patches of emphysema and collapse are seen in the upper lobe. The lower lobe is well aerated.

B. Hemorrhages in the cortex of suprarenals of a dog dying 96 hours after 30-minute exposure to 0.09 milligram-liter concentration of dichlorethylsulphide.

A
B

THE ORGANIZATION AND EQUIPMENT OF NAVY HOSPITAL UNITS.

By T. W. Richards, Medical Director, United States Navy.

While it is now generally known throughout the naval service that a certain number of organizations variously known as "Navy base hospital units" and "Navy station hospital units" are available for service or have actually been assigned to duty, there appears to be widespread confusion among members of the Medical Corps itself regarding the precise status of these units and the circumstances under which they were called into being. It is the purpose of this paper, therefore, to set forth in some detail the basic principles upon which these medical groups have been constituted, and particularly to indicate the rôle played by the American Red Cross in their organization and equipment.

Although navies in general, our own included, are commonly said to be always on a "war footing," and while this is true in the sense that all or a certain portion of the fighting units could, at any given moment, engage in battle, the statement obviously omits from consideration the well-known fact that enormous expansion of the personnel will occur coincident with or immediately subsequent to the outbreak of hostilities. It is furthermore apparent that such expansion must take place with great rapidity, since active naval operations may and often do begin immediately, whereas extensive military operations, so far as concerns the United States, might be appreciably deferred pending the transportation of large bodies of men overseas. Step by step with enlistments in the naval service come demands for hospital facilities and unless these have been prepared in excess before the outbreak of war great difficulty will be encountered in keeping pace with the growing demands. Under peace conditions our naval hospital facilities have been necessarily limited to current needs since public opinion in this country, as reflected in Congress, has never countenanced the expenditures which would be involved by hospital construction and equipment in excess of such requirements. It was foreseen, of course, that at any time upon the outbreak of war Government funds would be available in ample amount and that the problem which would then confront the Medical Departments of the Army and Navy would be, not lack of money, but inability to rapidly expend it. As a matter of fact, exactly this condition prevailed last spring and summer when it was found that the available markets of the world would not immediately suffice to procure in sufficient amount medical and surgical equipments which might have been urgently needed, although fortunately the international situation was such that opportunity was afforded to meet the more pressing demands as they arose.

Of the many who foresaw the situation outlined above and did their part to meet it there was no one, perhaps, who brought greater breadth of vision and foresight to bear on the peculiar combination of circumstances constituting the military hospital problem as a whole than Colonel Jefferson R. Kean, Medical Corps, United States Army, who in the summer of 1915 was officially detailed as Director General of Military Relief, American Red Cross. Realizing fully prospective needs he conceived the idea[1] that, through the agency of this society it might be possible to build up medico-military organizations at many of our larger civil hospitals, each constituting a group of medical men of the highest standing, together with nurses and attendants, all of whom were known to each other, personally and professionally, and who were accustomed to working along identical lines. Obviously these features would not only tend to promote a strong local esprit de corps without which the "units" would tend to disintegrate in peace times, but would permit successful teamwork immediately if the organizations were called upon for service in the event of war; both these advantages would have been appreciably lacking in large heterogeneous groups, drawn from various communities and animated to some extent by different professional standards. It was a brilliant conception and in the end met with extraordinary success, due largely to the tact and indomitable perseverance of its originator, as the difficulties encountered in carrying through this plan seemed at first almost insuperable, for it should be borne in mind that while the American Red Cross is now a stupendous organization with a membership numbering, perhaps, some 22,000,000 and a fund of over $100,000,000 (sufficient, Mr. H. P. Davidson, chairman of the War Council, informs the public, "to start with"), this society in 1915 was an infant in arms, its membership not in excess of 27,000, and no funds whatever available to provide equipment for such elaborate organizations as Col. Kean had in view. Moreover, to the general public, including the medical profession at large, the possibility that the United States might become involved in the present war, or any war for that matter, appeared extremely remote, and efforts to enroll active sympathy or financial support naturally encountered great inertia. Col. Kean's first efforts, therefore, were necessarily of an educational nature, for he had to convince many people that the time, money and labor to be expended were really worth while, and, in fact, it was only necessary to present this matter in its proper light to awaken the national en-

[1] I believe that Col. Kean himself credits the original conception of homogeneous units to Dr. George W. Crile (now major, Medical Reserve Corps, United States Army, organizing director of Army base hospital No. 4), who, shortly after the outbreak of the war in Europe, had gone abroad at the head of a group of medical men and nurses from his own operating department in the Lakeside Hospital, Cleveland.

thusiasm and patriotism which the medical profession of this country has since so amply demonstrated. During the succeeding fall and winter the personnel for seven Army base hospital units was organized, more or less completely, on paper, these being located in the larger medical centers, including New York, Boston, Philadelphia, Chicago, and Cleveland, and after some further delay funds approximating $25,000 each were raised and appropriated for the purchase of equipment by the local Red Cross chapters in the cities concerned.

It should be understood, of course, that this movement met with the hearty approval of the Surgeons General of the Army and Navy, and upon nomination of the latter, I was assigned to duty in charge of the Bureau of Naval Affairs, American Red Cross, for the special purpose of organizing, along the same lines, five Navy base hospitals which the Surgeon General considered desirable. My connection, therefore, with this undertaking dates back to July, 1916, at which time no equipment for any of the base hospitals had been procured. As there was then a serious shortage of personnel at Red Cross headquarters the supervision of this work for both Army and Navy hospitals was temporarily turned over to me.

As originally constituted each Navy base hospital "unit"—the latter term including both personnel and equipment—was organized upon a normal basis of 250 beds, or half the capacity of the Army standard. It was realized that further expansion might become necessary—and such, indeed, has been the case—but it was believed that the question of suitable accommodations—housing—would prove a serious one and that a 250-bed hospital might be quickly established where one of twice that size could not be quartered. In this connection a great deal of time and thought was devoted to the consideration of tentage and portable buildings, in the hope that some practicable means could be found for providing quarters in advance, thus making the units complete and independent of local facilities. It was decided, however, that the expense in either case was, if not prohibitive, at least unjustifiable and that storage and transportation problems, already serious, would become acute.

In organizing one of these units the first and most important consideration was the selection and appointment of the director, since he, in turn, would nominate—though he could not appoint—his associates. To adequately comply with all requirements the director must not only personify the very highest mental, moral, and professional standards, but be himself a leader of men who could inspire enthusiasm and create a following; indeed, it is not too much to say that the entire future of this undertaking hinged upon the possession of those attributes.

Fortunately it was possible to enlist the support of just such individuals, men at the top of the ladder, whose success as practitioners

and administrators in civil life afforded a safe foundation for trust and confidence; that all such expectations have been or will be more than realized is shown by the record of units now in service. At first I had anticipated some difficulty in filling our quota owing to the fact that commissions in the Medical Reserve Corps of the Navy gave only the grade of assistant surgeon to all members of the unit while officers in the Army organizations were distributed in the several grades up to, and including, that of major. This condition no longer prevails, the two services now being on a par, but I am happy to relate that the former unfavorable status did not appreciably influence the attitude of a single individual.

In selecting the medical staffs of the various units the National Committee on Red Cross Medical Service proved of invaluable assistance. This committee consists of 56 members, including the Surgeons General of the Army, Navy, and Public Health Service, the Presidents of the American Medical Association, the Clinical College of Surgeons of North America, the Congress of American Physicians and Surgeons, the American Surgical Association, the American College of Surgeons, and some of the most distinguished members of the medical profession throughout the country at large, such men, for example, as Biggs, Billings, Chapin, Crile, Cushing, De Schweinitz, Finney, Flexner, Le Conte, Martin, Matas, Mayo, Ochsner, Thayer, Welch, and others of equal standing. In many cases we also received advice from local medical organizations; thus, the director of the Navy station hospital unit organized at Columbus, Ohio, was appointed upon the unanimous recommendation of the Academy of Medicine of that city. He was at that time an officer in the Medical Reserve Corps of the Army, but resigned to accept enrollment in the Naval Reserve Force, and such transfers from the Army to the Navy, or vice versa, were not uncommon, both Surgeons General approving such requests when clearly indicated by national interests. When the medical and surgical staff of a unit was completely organized in a manner acceptable to this office individual applications for examination and enrollment in the Naval Reserve Force were forwarded to the Navy Department in the customary manner and each member was given not only the usual mental, moral and professional examination, but was required to demonstrate his particular fitness for the special duties he was expected to perform within the unit. Of the large number of applicants whose papers passed through my hands only two failed to pass the Navy professional examinations; in these instances the candidates were fully qualified for enrollment for general service, but failed to meet the requirements as X-ray specialists.

One of the most important elements in these organizations was the nursing staff, and in this connection the National Committee on Red

Cross Nursing Service played a most important rôle. Long before the United States became involved in war this organization had enrolled nurses in large numbers, selected from the very best in their profession, and as the physical, mental, and professional qualifications for enrollment as a Red Cross nurse are based upon the standards required by the Army and Navy Medical Departments a great saving in time and labor was effected, because nurses so accepted could be afterwards enrolled in the Naval Reserve Force without further preliminaries. It should be understood, however, that the examination papers of all nurses so enrolled are submitted to a representative of the Surgeon General's Office for approval and in any case of doubt the candidate is rejected. As a matter of fact, however, the examinations required by the American Red Cross have resulted in the selection of a very able and competent body of women, and of the thousands already called into service by the Army and Navy few have failed to measure up to our physical and professional requirements. The demands upon the nursing profession in this war have already been severe and promise to be stupendous, so that special efforts are now being made by the American Red Cross to keep up the supply and anticipate the increasing needs of the Army and Navy. Practically speaking, therefore, the Red Cross nurses afford a valuable reserve upon which the Army and Navy can draw in time of need, but like all other individuals in these units the nurses must be actually enrolled in the Naval Reserve Force before being called upon for service and they are then exclusively under Navy control and discipline. Forty nurses were assigned to each base hospital, with 20 in reserve, and the chief nurse of each unit was detailed to a naval hospital for instruction and training in matters peculiar to her future duties in the service.

When the first naval units were organized it was deemed inexpedient to attempt the enrollment of hospital corpsmen and other enlisted personnel, as Col. Kean had experienced great difficulty in retaining qualified men for Army units in time of peace. Among the most necessary individuals, for example, are cooks and mess attendants, and men to fill these ratings were particularly hard to hold. Furthermore, I felt convinced that this portion of the complement could be readily recruited under the impetus of war, and later this proved to be the case. In this connection some interesting problems arose; for, to make these units complete in all respects and available for foreign service when called upon, it was necessary to have an enlisted personnel which would take over all duties usually performed at our naval hospitals by civil employees as well as by members of the Hospital Corps, a procedure which involved some of the strongest traditions of the Navy. All preliminary details, however, were taken up with the Bureau of Medicine and Surgery and through that office

with the Bureau of Navigation, obsolete customs were cast aside to meet war conditions, and the following complement was officially authorized, the men to be enrolled locally for the several units:

1 pay clerk.
1 commissary steward.
1 chief yeoman (man or woman).
4 yeomen, second and third class (men or women).
40 hospital apprentices, first and second class.
2 carpenter's mates, third class.
2 electricians (general), third class.
2 plumbers and fitters.
2 coxswains or machinist's mates, second class, for chauffeurs and mechanicians.
1 cook, first class.
4 cooks, second class.
8 cooks, third class or fourth class.
20 mess attendants.

In addition to the above, the Bureau of Medicine and Surgery arranged to assign the following experienced men:

1 pharmacist.
2 chief pharmacist's mates.
3 pharmacist's mates, first class.
4 pharmacist's mates, third class.

In May, 1917, enrollments were begun in the various ratings, the men being selected by the directors of the several units and sent to the local recruiting office for examination, and if qualified for enrollment in the Naval Reserve Force. No serious difficulty was experienced in filling the complements, and the men were immediately assigned to duty for a period of training; the hospital corpsmen were detailed to our naval hospitals or a special course of instruction was given to some of them in civil institutions, following the lines of our Hospital Corps training schools so far as practicable. Naturally this question of training presented serious difficulties and I had grave doubts as to its success, but a fine class of men had been enrolled, most of whom had a high-school education and in many cases a college degree, and the naval medical officers who had them under observation spoke most favorably of their application and progress. To promote this work, some of the nurses and medical officers of the units were themselves assigned to duty and, after becoming more or less familiar with Navy routine, they in turn assisted in the instruction of the hospital corpsmen.

For the equipment of the Army base hospitals Col. Kean naturally decided to follow the allowance table as set forth in the Manual for the Medical Department, United States Army, 1914. This was also used, to some extent, as a guide in purchasing equipment for Navy base hospitals, after considerable modification to meet the views of

the Surgeon General of the Navy, the quantities being in most instances reduced in accordance with our smaller bed capacity, although certain essential items (such as sterilizers) were not curtailed in size. In order to keep expenditures down to a minimum, it was merely intended that the original equipment, purchased by the Red Cross and stored ready for use, should be sufficient to enable the hospital to begin work and continue in operation until the Medical Department of the Army or Navy, as the case might be, could complete the outfit. Even with this limitation, it was soon found that the allowance table as given in the Manual required amplification, for at the time this book was issued no base hospitals existed in this country and the equipment called for was really that of a magnified field hospital—a hospital which could be packed up and moved at comparatively short notice. For example, cots were specified instead of beds and the surgical instruments and many other items called for were limited by the special containers designed for field service. Many items could only be obtained through the Medical Department or Quartermaster's Department of the Army, and as soon as the prospect of war became acute this source of supply was cut off. Furthermore, as local interest increased in the organization and equipment of certain units, additional funds became available, so that material amplification was both advisable and practicable. This purpose was also promoted by the desire of the directors and other members of these units for facilities somewhat commensurate with those they were accustomed to in civil life; they felt that they could not do good work with the original outfits, and this attitude was greatly stimulated by a demonstration which took place in Philadelphia in October, 1916.

In response to a general demand, voiced by the surgical profession of the country, Col. Kean arranged with the War Department to have one of the Army base hospitals mobilized and set up under canvas in Fairmount Park as an object lesson which would bring out the weak points of these organizations and at the same time demonstrate their utility. This was accordingly done; a complete unit was brought on from Cleveland, Ohio, by Major George W. Crile, M. R. C., United States Army, the director. The equipment was set up in place and the entire organization was, in fact, put upon an operating basis. As a result, however, of the numerous comments and criticisms of the equipment and the use of tentage a board, of which I was a member, was appointed for the consideration of these subjects, and in January, 1917, accompanied by three of my confrères, I visited most of the Army base hospitals along the Mexican border for the purpose of obtaining data based on actual service. Among other results, this trip demonstrated the fallacy of looking upon a base hospital as a mobile unit and it showed also that, however complete the pre-

liminary equipment might be, such organizations would grow and expand after their establishment according to local requirements. No two hospitals on the border were of the same size, organization or equipment, nor were they dependent upon the field equipment called for in the allowance table; in fact, they were general hospitals in all but name, location, and the disposition of patients, and once established they could not have been moved without complete disruption, in this respect differing radically from field hospitals and evacuation hospitals.

Among the problems which caused special difficulty in selecting these outfits were those relating to electrical apparatus of all kinds, including X-ray and laboratory outfits and certain mechanical kitchen appliances. Realizing the possibility of service in France, investigation had shown that electric currents used in that country not only differed greatly from those to which we are accustomed, but that there was great diversity among the different districts of France itself, so that special provision was necessary to enable any particular piece of apparatus to meet the unknown requirements. There was also much discussion regarding the advisability of providing certain additional features in advance, such as laundry equipment, ice machines, and even electric-lighting plants. On the Mexican border such facilities were locally available for all the base hospitals, but it was uncertain whether such would be the case in France. As far as the Navy was concerned, we never had funds enough available for any unit to indulge in these luxuries, but certain Army units with strong financial backing were ultimately equipped with all these facilities, the expenditure in some cases amounting to $100,000, or four times the sum originally contemplated. Within the past three months I have seen a number of these hospitals in operation in France, and while in most cases these additional facilities have proved desirable, some of them, particularly ice machines, have been deemed superfluous in view of the necessity for conserving shipping space. Laundry facilities are practically lacking over there and this is being met by portable apparatus of French design, mounted on trucks; two of these are capable of handling the output of a 1,000-bed hospital and a good many have been already supplied by the American Red Cross Commission in France.

While the foregoing remarks, except those relating to equipment, pertain more or less to both Navy base hospital units and station hospital units, these organizations differ in minor details. The formation of station hospital units was not undertaken until last June, when the Surgeon General decided that he would utilize 10 additional organizations of smaller type than the base hospital units provided.

With his approval, therefore, the plan and organization indicated in the following circular letter was promulgated:

1. At the request of the Surgeon General of the Navy, the Bureau of Naval Affairs, American Red Cross, has undertaken to organize a new group of units to be known as "Navy station hospitals." These units are for the purpose of supplying, in part, the personnel for a number of new hospitals which are now being erected at various naval stations along the Atlantic Coast and one or two points elsewhere within the United States, to care for the rapidly expanding Naval personnel.

2. With a view to drawing as lightly as possible upon the civilian profession only five medical officers will be required for each unit, additional members being furnished by the Surgeon General to fill the complement from young officers already enrolled in the Naval Reserve Force. No equipment will be required, but if funds are available for the purchase of X-ray or dental outfits, ambulances, etc., such donations will be gladly accepted.

3. For organization purposes the personnel required for each unit is as follows:

Medical officers.—One director (who may be chief of either the medical or surgical section) surgeon, with rank of lieutenant commander; one chief of medical (or surgical) section, surgeon with rank of lieutenant commander; one specialist, eye, ear, nose, and throat, Passed Assistant Surgeon, with rank of lieutenant; one specialist, laboratory, Passed Assistant Surgeon, with rank of lieutenant; one specialist, X-ray, Passed Assistant Surgeon, with rank of lieutenant.

NOTE.—These grades correspond to the following in the Army, with the same rate of pay:

	Navy.	Army.
Surgeon	Lieutenant commander	Major.
Passed assistant surgeon	Lieutenant	Captain.
Assistant surgeon	Lieutenant (junior grade)	First lieutenant.

Nurses.—Twenty nurses, one of whom will act as head nurse until the unit is called into service.

Enlisted personnel.—One commissary steward; one chief yeoman (man or woman); four yeomen, second or third class (men or women); two carpenter's mates; two electricians (general); two plumbers and fitters; two coxswains or machinists, second class, for chauffeurs or mechanicians; one cook, first class; four cooks, third or fourth class; ten mess attendants.

When practicable it is desirable that medical officers and nurses be drawn from one parent institution, but this is not an indispensable requirement.

4. The director should select the members of his staff and inform the director, Bureau of Naval Affairs, whom he nominates for the various positions. The director should also nominate a head nurse, and it is important that she be a woman of executive ability in whom the nurses have confidence. Upon her will devolve the duty of selecting the nursing staff, all of whom must be, or become, members of the Red Cross Nursing Service.

5. Medical officers, nurses and enlisted men must be enrolled in the Naval Reserve Force. While the period of enrollment is nominally four years no one will be called upon to serve longer than the duration of the war, and it is important that this should be explained to all concerned. It must also be

understood that members of the unit agree to serve wherever and whenever called upon by the Surgeon General of the Navy.

6. The enlisted personnel will be enrolled at the navy yard or local naval recruiting office, and the recruiting officer will be furnished with a list of the various ratings as soon as the organization of a unit is begun. The director should keep in touch with the recruiting officer and send to him for enrollment any men whom he considers available and desirable; it is probable, however, that the recruiting officer will be able to obtain most of the men needed. Rates of pay and qualifications for the different ratings may be ascertained upon inquiring of the Navy Recruiting Officer.

7. It is expected that all members of a unit will serve as a group and not be assigned to independent duty as individuals.

8. Official information concerning enrollment in the Naval Reserve Force will be furnished as soon as a unit is authorized. All members will have to be vaccinated and take typhoid prophylaxis as soon as practicable. As soon as the head nurse is appointed she will be furnished with full information regarding the enrollment of nurses by the Director, Bureau of Nursing Service, American Red Cross, Washington, D. C.

9. At naval hospitals, now being erected, accommodations are provided for officers, nurses and enlisted men. If, in any locality, officers and nurses are not provided with quarters they will be granted commutation in lieu of same.

10. The outfit for enlisted men will be furnished by the Government. Such additional uniforms as the nurses require will be furnished by the American Red Cross, and if practicable, the local Red Cross Chapter should assist in providing funds for this purpose. Officers will be required to purchase their own uniforms; but officers in the Naval Reserve Force, when assigned to active duty in time of war, are credited with a uniform gratuity of $150. If an officer resigns from the service before the expiration of his four year's enrollment this sum must be refunded, but an officer placed on the inactive list after the war, or before, if his services are not needed, would still be entitled to this allowance. Medical officers of the Naval Reserve Force will require the following uniform:

1 overcoat.
1 blue service uniform (blouse, trousers, and cap).
2 to 4 white service uniforms (blouse and trousers).
1 white cap.
1 sword and service belt.
1 or 2 pairs of white shoes (worn with white service dress).

White socks are worn with white service, and black socks with blue uniforms.

With the experience already gained in organizing base hospitals there was little difficulty in starting these smaller units, which proved, indeed, to be very popular, especially in the smaller medical centers which would not readily support more elaborate organizations. As it had not been found practicable to establish a Navy base hospital unit south of Philadelphia, I was particularly glad to authorize units of this other type in Austin, Tex., and Atlanta, Ga., both of which have since been completed most successfully. Eight of these organizations have now (January, 1918) been assigned to duty at our newly constructed naval hospitals, while the others are either mobilized or ready for assignment wherever and whenever needed.

With one exception our base hospitals have now been doubled in capacity, with additions to the equipment far beyond a mere increase of the original allowance; most of these additions were provided by the Bureau of Medicine and Surgery, but certain special items—such as motor cars and ambulances—were obtained through the Red Cross. Material increase was also necessary in the personnel, so that the full complement is now as follows:

[1] 2 medical officers (commanding officer and executive surgeon).
18 medical officers.
1 pay officer.
1 dental officer.
60 nurses.
1 pay clerk.
1 commissary steward.
1 chief yeoman.
4 yeomen, second and third class.
2 carpenter's mates, third class.
2 electricians (general) third class.
2 plumbers and fitters.
80 hospital apprentices, first and second class.
2 coxswains or machinist's mates, second class.
1 cook, first class.
4 cooks, second class.
8 cooks, third class (or fourth).
20 mess attendants.
[1] 1 pharmacist.
[1] 2 chief pharmacist's mates.
[1] 8 pharmacist's mates, first class.
[1] 4 pharmacist's mates, third class.

Navy base hospitals No. 1 and No. 5 are now operating abroad, while No. 2 and No. 3 have recently been mobilized for foreign service; No. 4 is ready in all respects, but has not as yet been called upon. Before leaving France I had the pleasure of seeing one of these units installed and "in commission," doing work of the highest value despite local drawbacks and inconveniences which, in this country, would have seemed appalling. The building occupied was a Carmelite convent, built centuries ago, and still lacking all modern facilities except—at times—electric light and having a very limited supply of fresh water. Oil stoves had been taken over, but the original supply of kerosene was soon exhausted and no more was obtainable. Fortunately small coal stoves could be purchased locally and there was a Navy coal pile which could be depended upon. The labor involved in making such a place habitable was onerous and, upon occasions, repulsive, but difficulties were being met in a spirit of cheerful optimism which overcame all obstacles and a month later the director informed me "it looked like a different place."

[1] Assigned to unit by Bureau of Medicine and Surgery.

While endeavoring to perform the duties outlined above, and now practically completed, the director of the Bureau of Naval Affairs naturally encountered many unforeseen and unfamiliar problems which, at times, caused him no little anxiety and embarrassment. As a recompense, far outweighing such minor considerations, he looks back upon the formation of personal acquaintance and in some cases, I trust, lasting friendship, with many of the most distinguished representatives of our profession in this country. I found, as a rule, that details regarding the Navy generally and the medical corps in particular, were little known to them, though it was seldom indeed that this was due to lack of interest. But the successful surgeon is a busy man—he works "three shifts a day" as a normal routine—and under ordinary circumstances his path and ours lie far apart. Now many are wearing the "Navy blue," and it may be hoped that one of the happier results of the present catastrophe will be a better mutual understanding between members of the Navy medical corps and their confrères, until lately "in civil life."

THE EXAMINATION OF 8,518 MEN FOR THE DETECTION, ISOLATION AND TREATMENT OF MENINGOCOCCUS CARRIERS, AT THE UNITED STATES NAVAL TRAINING STATION, SAN FRANCISCO, CAL.

By P. S. Rossiter, Medical Inspector, United States Navy, and A. J. Minaker, Assistant Surgeon, United States Naval Reserve Force.

Upon the entry of the United States into the present war, and the consequent enormous influx of recruits from all parts of the country into camps and training stations, it became necessary to be on the watch for outbreaks of the various contagious and infectious diseases, and in view of the experience of the entente allies, and especially of the British, with epidemics of cerebro-spinal fever, the question of the detection, isolation, and treatment of meningococcus carriers became of primary importance.

The history of epidemics of cerebro-spinal fever in years past and since the outbreak of the present war has been so thoroughly dealt with by recent writers that no review is deemed necessary, nor is it within the scope of this paper to present the subject of meningitis in its various details, but merely to briefly report our findings during the culturing of something over 8,000 men.

In all recent reports the one outstanding feature concerning the transmission of this disease appears to be the fact that we have in the community at large a variable percentage of carriers of the meningococcus, who, under certain conditions of crowding and inadequate ventilation, transmit the organism to others, who either develop the disease, rid themselves of the infection, or in turn, become additional carriers.

In such carriers the organism is found in the nasopharynx, and particularly in the vault and adenoid area.

Sporadic cases of this disease had occurred for a number of years at all our training stations. At the naval training station, San Francisco, there had occurred one case in August, 1916, one case in January, two in March, one in April, two in May, and two in June, 1917.

Prior to the declaration of war the average complement of the San Francisco training station had been from 900 to 1,200, which number, upon mobilization, was rapidly increased to more than 5,000.

While there was no indication of an epidemic of cerebro-spinal fever at this station, and in fact the proportionate incidence of the disease had decreased with the increased personnel, due, it is believed, to improved housing conditions incident to quartering the men in camps rather than in barrack buildings, yet as several cases of cerebro-spinal fever had developed in drafts sent from the naval training station, San Francisco, to other camps, it was deemed advisable to culture the entire personnel with a view to the detection, isolation, and treatment of meningococcus carriers.

Parenthetically it may here be stated that the development of the disease in the drafts mentioned was subsequently found to be due to crowding and unhygienic conditions en route to and at the camps to which these men were sent, and that upon rectifying these sanitary defects the disease disappeared, and it is our opinion that cerebro-spinal fever is always produced by the lowering of resistance through fatigue, intercurrent disease, of which measles is the most important, or conditions of crowding and inadequate ventilation upon individuals who are carriers of the organism in their nasopharyngeal tract, combined with certain elements of local tissue, phagocytosis, or the presence of inherent or acquired antibodies in the serum, but we incline to the belief that the chronic carrier does possess such antibodies and a consequent relative protection.

These latter questions we have been trying to settle by using the serum of chronic carriers to agglutinate various known strains of meningococcus, the serum of known meningococcus carriers being used as a control, but so far only one case has given a suggestion of agglutination, and the results have been too varied to enable us to make any positive statement in regard to inherent or acquired antibodies in the serum of carriers, although certain cutaneous reactions made with a titration of the meningococcus prepared by Prof. F. P. Gay, of the University of California, seem to confirm the belief that such antibodies exist.

The problem presented was a serious one. The task of culturing a population of 5,000, which was being increased at a varying rate of from 1 to 200 per day, and of developing a rapid and reliable

technique so that we could, at an early date, forward from the station drafts, all members of which had been shown to be negative as meningococcus carriers, was not an easy one. The problem of laboratory equipment, getting together of a sufficient number of competent bacteriologists and making the enormous amount of culture media required was in itself formidable, but within 10 days the laboratory was equipped, its personnel organized, and a sufficient supply of culture media prepared to enable us to start culturing 150 men per day.

Technique.—The first question arising was the method to be adopted in procuring secretions suspected of containing meningococci, and it was decided to use the West tube generally advocated for this purpose, the pledget of cotton on the applicator being passed from the tube behind the uvula into the posterior nares, being then withdrawn into the tube and later extruded and the gathered organisms sown upon the desired media.

We have since discarded the West tube, the principal use of which is to prevent contamination by mouth organisms, as it was found to be extremely difficult by this method to reach the higher spaces in the adenoid region, the most common habitat of the meningococcus, the applicator extruded from the West tube having a tendency to curve forward upon itself before attaining the desired elevation. We have found that, by using a small pledget of cotton upon a wire applicator, the curved end being about 1½ inches in length and bent at an angle of 85°, and with the exercise of caution in procuring the material by medical officers, who have been carefully trained in this technique, little, if any mouth contamination results.

We have tried practically every type of medium which has been recommended for growing the meningococcus, including Flexner's sheep serum water agar, Martin's liver media, both with the addition of serum water and hemolized blood, pea media, trypagar, modified Vedder's, calf's liver agar, gelatin agar, a modified Loeffler's, and the Hiss water media with the various carbohydrates, and have found the most uniformly reliable media for primary cultures to be human blood agar.

Certain English investigators, notably D. Lloyd,[1] have demonstrated that the best suited medium for growing the meningococcus is one rich in "vitamins." To obtain this result we enriched nutrient gar media with human blood, 7½ to 10 per cent, in a 3½ per cent gar at plus 0.3 reaction. With a larger amount of "buffet," i e., basic potassium phosphate and calcium carbonate, we were able to se a lower percentage of blood, yet we were led to believe that the resence of the hemoglobin exerted a favorable influence over the rimary growth of the meningococcus and as human blood could be

obtained plentifully from volunteers, we have standardized on a 7½ per cent blood media. We did not find it requisite with this media to determine the hydrogen ion concentration described by Meyer.[2]

Finding that the final sterilization in 500 mil lots at 15 pounds pressure for 30 minutes was inadequate to destroy all spores, as the media was not wholly liquefied during that period and an unmelted core would remain in which live spores were contained, it became necessary first to liquefy the media in a water bath at 100 C. and then give it a full half hour in the autoclav at 15 pounds pressure. The 500-mil lots are then cooled to 40 C. and human blood is added in sufficient quantity to make 7.5 per cent. Where a large amount of blood was used inhibition seemed to take place, and above 10 per cent the meningococcus usually refused to grow.

Comparing all the media enumerated with the blood agar as a control, we found that in many instances where a sensitive strain was cultured and where cultures sown even on Flexner's sheep serum water agar or modified Loeffler's failed to reproduce, an abundant growth was secured from the blood agar. These results were frequently verified; therefore, having numbers of men willing to donate blood for the purpose, we were able to obtain what we consider an ideal and reliable media. We, however, found that about once in 100 times human blood seemed to have an inhibitory action on the delicate meningococci. In these cases recultures were made and repeated results seem to verify the belief that possibly antibodies exist in certain immune individuals in the proportion of about 1 per cent of young men. On this account, in order to avoid the use of media which may contain inhibitory antibodies, each batch of media is now tested with a pure culture of the normal and para groups of meningococci[3] prior to use.

Although we have had a large number of voluntary donors of blood, still on account of the enormous quantities of media required it has been necessary to conserve our blood agar, and we have found that the organism in subculture will grow readily on several media which are not so well suited for primary cultures, the best of which we have found to be Flexner's sheep serum water agar[3] and an extremely simple medium of our own, prepared as follows:

Calf's liver, 500 grams, is finely minced and allowed to stand over night in the ice chest in 1,000 mils of water. This is squeezed through gauze and cooked for one-half hour in the rice cooker with 2 per cent peptone and 0.5 per cent sodium chlorid. This broth is then clarified with the whites of two eggs and carefully titrated to plus 0.3 reaction. Thirty grams of carefully washed agar are then added and the medium again titrated, autoclaved and poured. We consider a reaction of plus 0.3 in all our media to be most important.

In the earlier stages of our work we were obliged, owing to lack of a reliable polyvalent antimeningitic serum for agglutination purposes, to rely largely for differentiation upon the Hiss serum water medium, with the addition of maltose, dextrose and lactose. This method served to differentiate the meningococcus from the crassus and catarrhalis groups of gram negative diplococci, but we found that we were obtaining a certain percentage of members of the pharyngeus group, giving the same reaction with maltose, lactose and dextrose as the meningococcus, to avoid which we were obliged to add levulose in order to bar out this intruder, which it did, with the exception of group 3, which has the same cultural characteristics on all of these media as the meningococcus. Here again we had difficulty, for we found that by fractional sterilization at 100° for three consecutive days with the 1 to 3 serum and the various carbohydrates and litmus, apparently rotary action of the sugars at times occurred. To avoid this, we now sterilize separately on three consecutive days our carbohydrates in 25 per cent solution, the litmus in 10 per cent solution, and the serum water 1 to 3. These are then mixed and autoclaved at 10 pounds for 30 minutes. Using 1 per cent of carbohydrate with liver agar and adding Andrade's indicator gave us a very satisfactory differentiation. This is now being used in connection with the Hiss water method and litmus, and from our findings is equally accurate.

We also found that Meyer's modification of Martin's medium and sheep serum water agar with 1 per cent carbohydrates and 1 per cent Andrade's indicator proved an excellent medium from which we had little difficulty in picking the colonies for macroscropic agglutination, as well as differentiations. In differentiation by the Hiss media, with the carbohydrates and litmus, if the results are to be relied upon, it is essential to have absolutely pure cultures, and the media must be prepared with the utmost care, since any slight break in technique will completely vitiate the end results.

Method of growing the meningococcus primarily.—On account of the difficulty at first encountered in obtaining an adequate number of Petri dishes, we used both 4-inch Petri dishes and 1-inch diameter slants for our primary cultures, but soon discarded the slants in favor of the Petri dishes, on account of the greater facility in inoculating the media, the larger presenting surface and the greater ase with which the more scattered colonies could be viewed and icked. We have also used the three-dish method, by inoculating ish No. 1 and immediately transferring part of the inoculated rface to dish No. 2 by a sterile glass rod, and inoculating dish No. from No. 2 in the same manner. We do not believe this method ecessary, as the inoculation of one half of a 4-inch dish by sowing

the collected organisms from the swab, and the immediate inoculation of the remaining half from the first by means of a sterile glass rod gives us sufficient scattering of colonies to permit the meningococcus to be picked with comparative ease.

We also found unglazed porcelain covers for the Petri dishes to be of the utmost value in doing away with a troublesome amount of water of condensation.

The suspected secretions are immediately sown on warmed media and at once placed in the incubator. Where cultures are taken at a distance from the laboratory, a portable incubator is used for transfer of the inoculated plates to the laboratory. Cultures are examined after 20 hours. Colonies are examined individually and smears made from suspicious colonies are stained by Gram's method to determine the gram negative diplococci. Gram negative diplococci being demonstrated, subcultures are made on successive days until pure cultures are obtained. The pure culture is determined for meningococci by the reaction in the Hiss serum-water-carbohydrate medium, as well as by agglutination with a polyvalent antimeningococcus serum in dilutions of from 1 to 50 to 1 to 400, with normal horse serum in equal dilutions as control.

As we became more familiar with the macroscopic appearance of the characteristic meningococcus colonies, we were frequently able to pick pure cultures from the 20-hour growth, and identify tentatively by means of a modified Krumwiede-Tunnicliffe microscopic slide agglutination.[4, 5] Our method consists in picking the suspected colony and emulsifying in physiologic salt solution. This emulsion and the polyvalent serum are then mixed on the slide in the desired dilutions. At the same time normal horse serum and the bacterial emulsion are mixed on the same slide in the same dilution as control. The slide is then incubated at 37° to dryness. The preparation is stained, and if agglutination has taken place, the case is at once sent to the isolation camp as a tentatively positive carrier. Subcultures are immediately made, and the result verified by macroscopic agglutination in dilutions of 1 to 50, 1 to 100, and 1 to 200, incubated at 55° for 18 to 20 hours, and by running the suspected organism through the carbohydrate media.

We at first had difficulty in obtaining a reliable serum which contained both the normal and para groups of meningococci among the commercial productions, and it was not until we obtained a supply of serum, first from the University of Toronto laboratory (the Fitzgerald serum) and later from the New York Board of Health and Rockefeller Institute, that our agglutinations were deemed sufficiently reliable to depend on them alone. We have more recently found the new Cutter Laboratory serum, which we understand is

now made from the Rockefeller Institute strains, to yield very satisfactory results. By means of monovalent rabbit sera obtained from the Rockefeller Institute, we have been able to determine the relative incidence of the normal and para types of meningococcus in our cases. This we find to be normal 78 per cent, para 19 per cent, indefinite 3 per cent.

Of a series of 1,000 agglutinations, 148 were definitely positive by the slide method with the Rockefeller Institute serum. In each of these cases, verification by the macroscopic method was positive. Where agglutinations were only suggestive, we had to carry through the carbohydrate reactions for determination. Suggestive agglutinations with typical carbohydrate reactions are promptly isolated. Of 200 attempted agglutinations in cases giving indicative carbohydrate reaction, 52 per cent proved finally positive.

The agglutinating power of a number of the commercial sera for the micrococcus catarrhalis and the diplococcus flavus suggests the possibility of the confusion of these organisms in the preparation of antimeningococcus sera and the consequent agglutinating power of such sera for organisms other than the meningococcus.

Subculturing the meningococcus.—Subculturing requires the greatest care, as the smallest factor interfering with the growth frequently results in the loss of the meningococcus. Furthermore, when cultures of this delicate organism become even slightly contaminated by the pneumococcus or diphtheroid organisms (its most frequent associates) it is extremely difficult to obtain a pure culture.

To ascertain if such contaminating organisms interfered with definite agglutinations, the usually associated bacilli and cocci were mixed with known stock strains of the meningococcus and the mixtures subjected to slide agglutinations. In practically every case, the meningococci grouped themselves and the foreign bacteria remained scattered over the field. In the case of a gram positive diphtheroid bacillus, and a certain small gram negative bacillus, the contaminating organisms grouped themselves with the meningococci. From the above it is evident that agglutinations are frequently possible in a 20-hour growth, even in the presence of slight contamination, and it is practicable to make a tentatively positive diagnosis and isolate the carrier within 24 hours of culture. We at times encountered a gram negative bacillus occasionally in diplo formation, which gave a pronounced agglutination with the Rockefeller Institute serum and had to be most carefully observed to avoid confusion.

Isolation and treatment of carriers.—Men proven to be carriers are immediately isolated in a special quarantine camp and treated for five consecutive days. Treatment is then discontinued for 24 hours and another culture taken from the nasopharyngeal vault. This culture proving positive, the treatment is repeated. Should it prove

negative, no further treatment is given, and a second culture is taken at the end of five days. This routine is continued in the case of each carrier until four consecutive negatives at five-day intervals are obtained, when the man is discharged to duty and an entry made in his health record that he has at one time been a meningococcus carrier and recommending him for further observation.

All men remaining on the station have been recultured not less than two weeks after discharge and to date no case discharged after four consecutive negatives at five-day intervals has proven positive upon subsequent culture.

A card index is kept of every man cultured, with reference to the laboratory sheet on which the full report of his cultural and agglutination reactions is recorded.

Numerous methods of treatment have been tried, with varying results. Chloramine was not obtainable, and the steam-chamber method advocated by Gordon and Flack[6] seemed a circuitous method by which to deposit a small amount of antiseptic in the desired locality.

Among the various treatments tried, the most effective, each of which gave more or less satisfactory results, have been:

Irrigation of the nasopharynx three times daily with dilute Seiler's solution, followed by irrigation with 1 per cent zinc sulphate solution, or by application with a swab of 2 per cent zinc sulphate solution.

Irrigation with Seiler's or with Seiler's and peroxide followed by swabbing with one-fourth of 1 per cent iodine.

Irrigation, followed by swabbing with a mixture of iodine, 0.5 per cent; phenol, 1 per cent; ferric chlorid, 10 per cent in glycerin.

Dichloramine-T in chlorinated eucalyptol and chlorinated paraffin oil.

All of the above methods have yielded more or less satisfactory results, but we are of opinion that swabbing the nasopharynx with the phenol-ferric-chlorid-glycerin mixture three times daily, or the post nasal spray of dichloramine-T solution is especially efficacious. In the case of the latter, we have been unable to continue its use in the strength recommended by Dakin, on account of the painful irritation produced after the first few treatments, but have found it thoroughly practicable and sufficiently effective when diluted one-half with plain paraffin oil.

A point of observation of the utmost importance was the tendency of certain chronic carriers, when allowed unrestricted association, to reinfect associated carriers, who had given one or more negatives, and one case under treatment for 80 days repeatedly reinfected men who had given two or more negatives, who were allowed to

sleep in the same room, the two men occupying a room of 729 cubic feet, having one window and one door.

The U. S. S. *Rainbow*, where the men were crowded, and the ventilation none too good, yielded a large percentage of carriers, and the radio station, where a number of men were closely associated in closed rooms and alternately using the same telephone transmitters, yielded 7 carriers out of 40 men.

The question of a filterable virus etiology brought up by Hort[7] and others suggested itself. The only evidence which we can bring to bear on this point is the single case of cerebro-spinal fever which occurred on this station after culturing the personnel was begun. This case occurred in a man not yet cultured. The same type of meningococcus was isolated from his spinal fluid, from his posterior nares, and from the posterior nares of two out of three contacts.

At the present time every man on the station has been cultured and either found to be negative or has been isolated and treated, and all recruits received are cultured within 24 hours of their arrival and carriers immediately isolated.

Needless to say, an enormous amount of statistics has been accumulated from our work, but for the purpose of this paper we deem it necessary to cite only a few tabulated results, which are in close accord with the findings of the British workers.[6-8]

Total number of cultures taken	8,518
Number of carriers	261
Percentage of carriers	3.16

Number of cultures, results by months, July to December, 1917.

July:	
Total number of cultures	676
Total number of carriers	13
Percentage of carriers	1.92
August:	
Total number of cultures	3,453
Total number of carriers	119
Percentage of carriers	3.1
September:	
Total number of cultures	2,029
Total number of carriers	73
Percentage of carriers	3.6
October:	
Total number of cultures	1,325
Total number of carriers	25
Percentage of carriers	1.9
November:	
Total number of cultures	1,033
Total number of carriers	31
Percentage of carriers	3.0

T. N. Bassett, at the Royal Naval College,[6] found 1.12 per cent of carriers in 4,730 supposedly noncontacts, and 5.77 per cent of positives in men who had been in contact with known carriers.

Observation of 173 consecutive carriers under treatment showed the following results:

	Cases.
Giving 4 consecutive negative cultures	22
Giving 1 positive and 4 negatives	37
Giving 2 positives and 4 negatives	9
Giving 3 positives and 4 negatives	4
Various results	101
Length of time in isolation:	
22 days	22
25 days	43
27 days	24
35 days	29
45 days	42
55 days	22
65 days	8
75 days	1
80 days	1
82 days	1
Nine hundred and sixty consecutive cases showed the following florae:	
Gram negative diplococci	410
Meningococci	39
Diphtheroids	212
Pneumococci	78
Gram negative bacilli	108
Straphylococci	98
Streptococci	24

The gram negative diplococci and diphtheroids were usually associated, and where gram negative bacilli were found, they were usually in almost pure culture.

In the 8,000 cases 13 diphtheria carriers were detected, isolated, and treated.

Summary and conclusions.—1. That there are in the community at large, especially among young adult males, a variable percentage of carriers of the meningococcus, varying from 1.5 per cent to 3.5 per cent, who, under certain conditions of crowding and inadequate ventilation, transmit the organism to others, who either develop the disease, rid themselves of the infection, or in turn become additional carriers.

2. That it is entirely practicable, by cultural methods, to detect these carriers and isolate them within 24 to 72 hours.

3. That under proper hygienic conditions little is to be feared from such carriers, but that under conditions of crowding, inadequate ventilation or lowered resistance they become a serious menace.

4. That a large percentage of such carriers are readily freed of infection by various modes of treatment which tend to deposit antiseptic agents on the previously cleansed mucous surfaces of the nasopharyngeal vault.

We wish to acknowledge our indebtedness to Profs. F. P. Gray and L. C. Hall, of the University of California, and Dr. K. F. Meyer, of the Hooper Foundation Institute, for their advice and encouragement in this work, also to Assistant Surgeons Chamberlain, Fielder, and Goettsch, United States Naval Reserve Force, for their tireless, earnest and careful work.

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LABORATORY DETECTION OF CARRIERS OF MENINGOCOCCI AT THE LABORATORY OF THE UNITED STATES NAVAL TRAINING STATION, GREAT LAKES, ILL.

By C. W. Barrier, Assistant Surgeon, and R. M. Choisser, Assistant Surgeon, United States Navy.

In recent years cerebro-spinal fever has become one of the principal diseases of camp life and is especially prevalent at all training and mobilization points where younger men from all parts of the country are brought together. It has long been thought and doubtless correctly that the spread of this disease is due to carriers and the detection of these carriers has fallen to the laboratory. This work has formed a large part of the work of the laboratory of the Great Lakes Station for the past few months. At first we were able to take only 50 to 100 cultures a day, but when we compared this small number with the large number that we saw would have to be made render our work effective, the magnitude of the task became apparent. By a slow elimination of nonessentials and an improvement methods we have reached a point where we now make from 300 1,000 cultures a day and our grand total since July has long passed 0,000.

Such a large number of cultures has made the question of culture media an important one. We have selected blood agar from the many that have been used for such work. The reasons for this choice are, first, the ease with which it is made and, second, its suitability for growing the meningococcus. The ease of making blood agar becomes quite apparent when we compare it with most of the other media suggested by various laboratory workers. Nutrient agar is found in every laboratory, and blood can be obtained from a number of animals, and the mixing of these in proper proportions is an easy matter. The suitability of a medium is determined by two factors: It must possess substances in form needed for the growth of the organisms, and it must be of such a nature that the colonies can be recognized with ease after they have been grown. The best growth has been secured on blood agar, and the blood serves as a useful indicator in separating the colonies into two large groups—the hemolytic and the nonhemolytic.

The agar is not the usual nutrient agar but a modified one, being richer in some substances, especially peptone. The general formula is: Agar, 18; peptone, 10; beef extract, 4; salt, 5; water, 1,000.

The two important points in the preparation of agar are to obtain the right reaction and to have the correct amount of moisture. A reaction between plus 0.2 and plus 0.5 gives what is desired, but to pass these limits in either direction lessens the value of the medium. The titration is not a simple thing and errors are easily made, due to the presence of the agar and the necessity of titrating while hot. The best results can be obtained by using a large amount of phenolphthalein and calling the neutral point the first distinct but faint pink, which does not disappear on further boiling.

The percentage of agar determines the stiffness of the medium and available moisture, a matter very important in a medium for the meningococcus. It is best not to stick to a fixed agar percentage, but to experiment and choose that percentage which produces a medium just stiff enough to allow easy streaking. The other factors determining the moisture of the medium are that it should be poured into plates shortly before they are used and that enough should be put into the plates to prevent drying out during incubation.

The agar is made in large quantities and is stored in 500 c. c. flasks, 300 c. c. to each. We use either goat's or sheep's blood, and do not believe that one type of blood has any distinct advantage over another, but these two animals furnish it most conveniently. Figure 1 shows the apparatus used in drawing blood.

In the flask shown in figure 1, draw about 300 c. c. of blood. If the blood flows freely and rapidly it is best not to attempt to defibrinate while the flask is filling, but when the desired amount has been

Method of obtaining blood.

Type of swab used for making cultures.

obtained the flask is detached from the needle and shaken briskly for about 15 minutes. Defibrination is effected by the wire rods in the flask. The direction of shaking should not be in a simple circle, but should be double so that the blood rises higher in its revolutions on one side than on the other. There should be a slight jerk in the shaking so that the blood is brought against the wires with a dash. It is our custom to take two flasks of 300 c. c. each at a time, and to bleed once every 10 days.

After the blood is defibrinated it is poured into sterile test tubes, 20 c. c. to a tube, and placed on ice. Before the blood is used it is

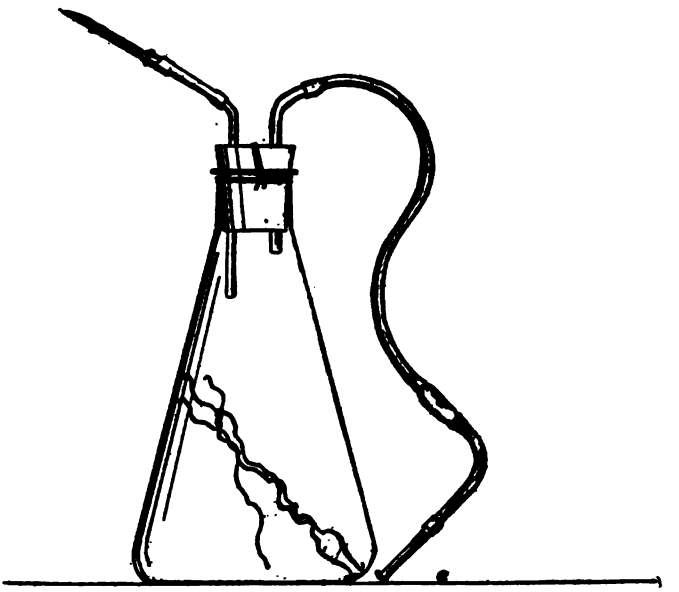

FIG. 1.—Flask with wire rods for collecting and defibrinating blood.

well to inspect the tubes for black spots, and if any are found the tubes should be discarded, as the spots indicate infection, due, in our experience, to the hay bacillus.

When the plates are to be made a sufficient number of these flasks of agar are melted up and cooled to the right point and the blood is added. As the agar is stored in 300 c. c. quantities and the blood in 20 c. c. amounts and as we wish to have two-thirds c. c. of blood to 10 c. c. of agar, we add one test tube of blood to each flask of agar, which gives the proper proportion. No attempt is made to measure the amount of agar poured to a plate, but sufficient amount is put in to cover the bottom well without tilting the plate to distribute it. In the Petri dishes we are now using, many bulge up on the bottom and about 20 c. c. of agar are necessary, but in the flat bottom dishes only about 15 c. c. are required. As stated above, these plates are poured

only a short time before being used and are protected from the dust while hardening. They are not placed in the ice box as this would necessitate warming the plates before using them.

The same method is used in making blood-agar slants. The blood and agar are mixed directly in the flasks and poured into sterile test tubes which are slanted. This saves much time over the method of tubing the agar and measuring the amount of blood for each with a pipette.

The cultures are put on the plates at the different camps of the station and are then brought to the laboratory for incubation. In taking the cultures we use a swab made of small galvanized wire, cut in lengths of 8 inches. They are bent one-half inch from one end so as to make an angle of 135°. This end is wrapped with cotton. Ten swabs are placed in a test tube and autoclaved. It is needless to say that the same wires are used over and over.

In taking the cultures the man's mouth is wide open and his tongue is held down by a tongue depressor in the left hand. The swab is entered without touching the buccal cavity and the man is instructed to say "ah" so that sufficient space is made between the soft palate and the tongue for the swab to get into the pharynx untouched. The swab is then rubbed over the upper portion of the posterior pharyngeal wall until it is well moistened with the secretion. It is then removed, precaution being taken against buccal contamination. A small part of the plate is then rubbed with the swab, effort being made to transfer some of the mucus. A better growth is obtained if this is done. The plate is then streaked through the spot with a long limber platinum wire. Three cultures are placed on a plate by dividing the surface of the medium into three equivalent parts by parallel lines on the bottom of the plate. If these lines are made with a blue wax pencil they show through the medium.

The agar plate is warm when the culture is placed upon it and care is taken to keep it warm until it reaches the incubator. The best way to do this is to transport the plate in a large box lined so as to retain the heat furnished by large rubber water bottles.

The plates are now kept at 37° for 18 hours in incubators which should not vary more than 1° in either direction. Very poor results are obtained if the temperature passes 39°, as the surface of the agar becomes dry, the colonies cease to grow, and dry on top. Upon examination of such plates, extensive water of condensation is found which may be a danger to the laboratory workers and often spoils the growth by running across the surface of the medium. The time of incubation is important. Sixteen to eighteen hours give the most typical colonies and shortly after this the viability of the organisms in the colonies begins to decrease, so that transplants

should be taken before the culture becomes too old. Again, if one accustoms himself to working with cultures of the same period of growth he becomes more proficient in the detection of the meningococcus. In examining the plates the blood in our medium, as stated above, has divided our colonies into two large groups, the hemolytic and the nonhemolytic. If it were not for this one fact we would not need to consider the hemolytic colonies, but occasionally the zone of hemolysis from these extends so far as to include colonies that are not hemolytic, and these are at times the meningococcus. The colony which is the real hemolyzer can be determined by its position in the zone and the fact that most hemolyzers are smaller, flatter and dryer than the meningococcus colonies, and some contain pigment.

The nonhemolytic colonies other than the meningococcus are eliminated by a study of their colors, size, shape and moisture. The diagnosis of the meningococcus colony is made by the following characteristics; it is nonhemolytic; its size depends upon other organisms, proper incubation and especially the quality of the medium. Under favorable conditions the colony grows to the size of a pinhead or even a match head, and almost pure cultures are found. The shape is that of a flattened globule. It is a mean between the flat colony which lies low on the surface and the one which rises like a sphere above the surface. A colony never has a plateau-like or umbilicated top, and its edges make a gentle obtuse but definite angle with the surface of the medium, and the base of the colony is markedly circular. It is not perfectly transparent and "like a dewdrop," but is slightly milky and glistens only moderately. The surface is moist, however, and when the colony is young it has a slightly slimy appearance. As it grows older it appears finely granular; the older the colony the more milky it is, and the same is true of the older part of the colony, the center. When touched with a loop a colony picks up easily, and it can now be definitely determined that it is not watery. It cannot be pushed along the surface as a whole and is not at all stringy, but is like a moist mass, made up of soft and extremely fine granules. When a colony picked up on a loop is put in a drop of water on a slide it melts off and the drop becomes turbid. A smooth and even suspension is made without any stirring. When the drop dries, there is an even milky spot on the slide having a slightly heavier border.

By study of the colonies along the above lines, most organisms are eliminated, except a few Gram-negative bacilli and some Gram-negative diplococci, a few of which are probably akin to the meningococcus. The bacilli are eliminated, of course, after the stain is made. The Gram-negative diplococci, however, offer a more difficult problem. A few can be eliminated by subculturing on such a medium as Loeffler's blood serum and observing pigment formation, but much

information is obtained from a close study of the Gram stain. The true meningococci are evenly distributed and are never in clumps. They are found singly and in pairs, not in tetrads or chains. They are plano-convex like the gonococcus, but vary in size and slightly in shape. There is an early tendency to vacuolation and not all take the counter-stain with the same intensity. The outline of the meningococcus is rather definite and there is no intimation from a stained smear that there is any substance between the cocci such as cellular products of an albuminous nature. In cultures 24 to 48 hours old only a shell remains of most of the organism. This is probably due to their fragility and tendency to early autolysis.

In finally passing on the diagnosis of a culture the agglutination test is considered the deciding factor. For a long time both a microscopical and macroscopical agglutination was done on all Gram negative diplococci from suspicious colonies, but as the results were identical in several hundred tests the microscopical method was abandoned, except where a rapid diagnosis was called for. This was oftentimes the case, as it was frequently necessary to decide whether or not men should be excluded from drafts leaving the station. In such instances one could not wait upon the slower macroscopic test. Then again cultures are often lost through contamination when transferred from the plates to the tubes.

The microscopic agglutination test is very similar to the hanging drop Widal for typhoid. In making it take two perfectly clean cover glasses from which all grease has been removed by acid alcohol and a passage through a flame. Upon each of these three there is made a slightly turbid suspension of the suspected organism by placing a loop full of salt solution upon the cover slips and adding to these drops sufficient organisms taken from the same colony to make suspensions of equal turbidity. To one of the suspensions there is added a loop full of 1–20 dilution of antimeningococcic serum and to the other an equal amount of the same dilution of normal horse serum as a control. Then invert over these slips a double concave slide.

It is very necessary that the chamber formed between the cover slip and the slide be air-tight or else the preparation will be ruined by drying. This is accomplished by first warming the slide and painting the edges of the concavities with petrolatum over which the cover slips are placed. The slide is carefully warmed again over a low flame and the edges of the cover glass pressed down with the butt end of the loop holder. The preparations are incubated for an hour at 55° and placed in the ice box for an other hour after which they are read. If positive, the drop containing the antimeningococcic serum shows a distinct clumping of the organisms, while the control maintains its former turbidity. If the suspensions were sufficiently cloudy in the beginning the results can be read with the naked eye,

but otherwise it is necessary to use the low power of the microscope. Some strains of meningococci agglutatinate within a few minutes after the addition of the serum, and incubation is unnecessary.

In the macroscopic agglutination five small tubes are used for each test, four of which contain dilutions of immune serum and the fifth a dilution of normal horse serum as a control. Into the first four tubes put 0.8 c. c. of sterile salt solution. To the first add 0.8 c. c. of a 1–20 dilution of antimeningococcic serum and mix thoroughly. This is done by drawing the solution back and forth in a small bore glass tube, graduated to 0.8 c. c., to which an ordinary gum nipple is attached. Now carry 0.8 c. c. to the second tube and so on through the four tubes, the final 0.8 c. c. being discarded. This now gives us a dilution of 1–40, 1–80, 1–160, 1–320 in the respective tubes. In the fifth tube place only 0.8 c. c. of a dilution of 1–80 normal horse serum for a control. Now, make a suspension of the cocci by adding to each 18-hour growth on blood agar slants 1.5 c. c. of sterile salt solution. The growths are then rubbed off the surface of the medium by a sterile platinum wire and are shaken until the suspensions are even. Add 0.2 c. c. of this suspension to each tube, which makes the final dilution 1–50, 1–100, 1–200, and 1–400, respectively for the test and 1–100 for the control. The tubes are now shaken separately until a uniform mixture is obtained and are placed in the incubator at 55° overnight. The following morning they are put in the ice box for several hours after which the results are read. The results are strikingly clear cut. In the negative ones no change will be noticed, or else a slight clumping will be seen in the control as well as in the tubes containing the immune serum. In the positive ones the first tube is clear with a heavy clump at the bottom, the second shows a smaller clump with probably a slight turbidity, and the third and fourth show still smaller clumps with a greater turbidity. The control remains unchanged.

We are conscious of numerous objections raised against agglutinating cultures grown on a medium containing blood serum, but we consider these ultrascientific. When the advantages of a sure and luxuriant growth are borne in mind as well as the uniformly good results, checked by various means, we must consider blood agar as the medium of choice for routine work.

It was stated above that the agglutination test was final in determining the diagnosis, but in reality the test is rather arbitrary, for there is sufficient reason to believe that many pathogenic cocci, which resemble the meningococcus in every other respect even to the sugar fermentation, do not agglutinate with the sera used. Dr. Mathers, of the Memorial Institute, has cultures obtained from the spinal fluid of fatal cases that can not be induced to agglutinate with any diagnostic or therapeutic serum.

THE CONTROL OF DIPHTHERIA CARRIERS AND SUSPECTS, CITY PARK BARRACKS, BROOKLYN, N. Y.

By G. B. Whitmore, Passed Assistant Surgeon, United States Navy, and P. B. Welch, Assistant Surgeon, United States Naval Reserve Force.

During the latter part of September an outbreak of diphtheria occurred in the City Park Barracks, Brooklyn, N. Y., which was the subject of a preliminary report. At that time we stated what, in our opinion, was the original source of infection with the most probable routes of dissemination of contagion together with the methods used to control this outbreak.

The following is a résumé of our previous work, including what seem to us to be not only interesting but very important facts well established by our experience in the control of this outbreak, viz, the frequency of recurrence of positive cultures in cases of clinical diphtheria and carriers which have had two or more successive negative cultures taken at 24-hour intervals. From our experience it has been obvious that if we had been satisfied with the conventional two successive negative cultures required by most hospitals and boards of health to discharge a man from observation we would have been reinjecting living virulent diphtheria bacilli directly into the same squad rooms we have been so careful to sterilize; and with what results? More cases of diphtheria from an unexplainable source would have occurred as has actually been the case elsewhere in our service.

We cite here the case of one man (W. G. H.), landsman for electrician, who was admitted to our isolation ward with a positive culture on the 17th of October and finally discharged from observation on the 30th of October, after having obtained six successive negative cultures, with the following interesting if not alarming results:

Nine days after his discharge from observation the first case with a positive culture was taken from his squad room and isolated. Then six other positive cases were taken from the same squad room, as follows: On the 17th of November a clinical case of diphtheria was found and sent to isolation. On the 21st of the month two more positive cases were found. On the 27th another case was found, followed by two cases on December 2 and 3, making a total of seven cases occurring in a squad room accommodating 48 men in a period of 34 days, all traceable to this one man who was discharged with six successive negative cultures and who subsequently was found to harbor living virulent diphtheria bacilli.

In connection with this squad room another case of interest is that of E. G. B., landsman for electrician, a clinical diphtheria with two positive cultures, who was transferred to the Willard Parker Hospital for treatment. This patient was discharged to duty from the

hospital after having two negative cultures. The following day a confirmatory culture was taken by us and found to be positive. This was followed by positive cultures on two successive days and a reappearance of a diphtheritic membrane.

It would appear to us that these two instances are clear enough to bear out our contention that all cases with positive cultures, whether clinical diphtheria or carriers, should be kept under observation for a longer period of time than is customary.

In addition to these particular instances, the following is quoted from our statistics: "Out of 63 men isolated with positive cultures 14 have had two or more successively negative cultures at 24-hour intervals followed by positives, while nine have had three or more negatives followed by positives. One case has had four negatives and another six successive negative cultures, only to be followed by a positive."

The importance of these occurrences as they affect the control of epidemics can not possibly be overemphasized when we realize that the average diphtheria case is discharged from observation on obtaining two successive negative cultures at 24-hour intervals. These cases being returned to their squad rooms and duties still harboring living virulent diphtheria bacilli in their throats and nasal passages infect the men with whom they are associated and men who may be less resistent to infection with the diphtheria bacilli and who, in turn, are a source of danger through contagion to their associates.

One might naturally think that our results were due to faulty technique or errors in diagnosis. This, however, would not seem to be the case because we have had considerable experience and the technique is very simple. The cultures are taken from the nose, nasopharynx and fauces with cotton swabs on wooden applicators, which have been sterilized with live steam in individual glass tubes plugged at the end with cotton. Loeffler's blood agar is used as a culture medium, the innoculated tubes being sent to the laboratories of the department of health, New York City, for culture and diagnosis. In addition to this, during the last month additional cultures have been taken on all cases isolated, and on all suspicious looking throats seen during sick call, these being incubated and examined in our laboratory at City Park Barracks.

In most instances our results have been the same, the department of health reporting more positives than we have found, their tendency being, perhaps, to err on the side of safety and report as positive cases which we have thought only suspicious. However, our results have been only slightly divergent and our conclusions based on the combined findings of both laboratories.

During the past two months we have taken 4,127 cultures; 2,447 during October, with a daily average of approximately 80, of which 3.4 per cent were positive, while during the month of November we took 1,680 cultures, with a daily average of 56, of which 6.4 per cent were returned positive.

At first glance it would seem that the number of cases was on the increase. However, the reverse is the case, for during the month of October we had 34 positive cases, of which 10 were clinically diphtheria, while during the month of November we had only 29 new positive cases, of which only 2 were clinically diphtheria. The higher percentage of positives obtained during November is, therefore, not due to an actual increase in the number of cases found, but rather due to the fact that we have discovered all carriers in the barracks and have isolated them, making them innocuous as spreaders of contagion. This is borne out by the decrease in the number of cases of clinical diphtheria occurring during the month of November.

In the following paragraphs are set forth the methods we have found most successful in preventing the spread of contagion. The management of this outbreak might be roughly divided into (1) general sanitation and hygiene, as applied to the grounds and squad rooms, and (2) care of the individual, including his personal belongings, clothing, bedding, etc., and isolation ward, as well as the personnel of the squad rooms.

GENERAL SANITATION AND HYGIENE.

Grounds.—The surface soil of the grounds had been reduced to a fine powder by the constant crossing and recrossing of the men coming and going to their squad rooms and stations. This resulted in dense dust clouds arising with every gust of wind that blew through the yard. The dust was unquestionably infected by the secretions from the nasal passages and throats of men infected with acute follicular tonsilitis, if not with diphtheria, and unquestionably disseminated contagion.

This condition has been very satisfactorily remedied by covering these areas with four inches of washed gravel, which not only prevents dust clouds from forming, but prevents the formation of stagnant pools of water.

Drinking fountains.—Bubbling fountains with sanitary cups or nozzles are furnished, but the water pressure was not sufficient to force the stream of water clear of the nozzle, making it necessary for one to apply his lips to the nozzle to obtain a drink of water. This condition has been remedied by putting fewer nozzles on each water feed pipe.

Overcrowding.—The estimated air space for each man in the squad rooms of the barracks is 250 cubic feet. This space is insufficient with the facilities on hand for heat and ventilation. It has been recommended that the personnel of the squad rooms be reduced from 48 to 30. This overcrowding undoubtedly plays an important part in the dissemination of contagion by the lowering of resistance to infection of the men thus crowded and by forcing the men thus living into closer physical contact, exposing them more to droplet infection from sprays of moisture thrown out by infected men in talking, sneezing, and coughing.

Mess gear.—The mess gear is cleansed by running through two tubs, one of soap suds and the other of clear water through which live steam is driven. This is an effective sterilizer, and the possibilities of contagion through this route seem remote.

MANAGEMENT OF THE INDIVIDUAL.

Culture, isolation and immunization.—We have set a hard and fast rule to isolate all cases found with any patches in their throats. At this time these cases are all cultured as a matter of routine and given prophylactic injections of diphtheria antitoxin. Thereafter daily cultures are taken. In cases in which positive cultures are obtained the procedure varies, depending upon the clinical picture presented. In the presence of a definite exudate the patient is given a curative dose of antitoxin and forwarded at once to the naval hospital at New York (Willard Parker Hospital, contagious), together with a record of the number of positive throat cultures obtained and the amount of antitoxin given. If, on the other hand, the patient presents no evidence of an active diphtheritic process he is retained in our isolation ward for further observation and treatment; and if no membrane develops he is classed as a carrier and is carried until three successive negative cultures are obtained at 24-hour intervals.

It might be well to state here that *all* cases isolated are retained in the isolation ward until three successive negative cultures are obtained at 24-hour intervals. They are then discharged, but are restricted from liberty for 48 hours, during which time they are instructed to report for morning sick call for two more successive cultures. In addition they are instructed to return in seven days for another confirmatory culture. At the time of discharge each patient's belongings are sterilized before being returned to him.

In isolating all cases in which patches occur in the throat it may seem that we are needlessly isolating cases that we know to be cases of acute follicular tonsillitis. We feel justified in this course, however, by the results we have obtained, not only in the control of

diphtheria but also in the control of acute follicular tonsillitis, which condition we are all agreed is contagious by its own right and may by itself work havoc among the personnel of any organization. As corroborative evidence of the efficiency of this plan it can be stated that with an average complement of 3,000 men during the past two months we have only had 177 cases of follicular tonsillitis at a season when this condition is usually rampant.

Personnel of the squad rooms.—The personnel of the squad room from which the positive case is taken is cultured and all positive or suspicious cases are isolated. The squad room itself is then cleared of all gear, bags, and personal belongings of the men, and the walls, floors, and bunk frames are thoroughly scrubbed with a cresol solution. Fumigation is not practicable, owing to the temporary nature of the structure which makes sealing of the compartment impossible. While the squad room is being sterilized, the men from that room are scrubbing their bags, bunk bottoms, mattress covers, etc., it being impossible to sterilize these articles for them with the limited means at our disposal.

To prevent the possibility of having missed a positive case in the infected squad room and to prevent the widespread dissemination of contagion to other camps or ships, the infected squad room is restricted further, in that no transfers of men are allowed in or out of this room for a period of 14 days from the time the last positive culture was obtained. At the end of this period, and before restriction is removed, all men in the infected squad room are cultured again.

This measure is considered of the utmost importance, as we have found the source of our contagious diseases in several instances has been in the men received from other stations where this precaution had not been carried out.

During the routine of culturing squad rooms we have had the men report for culture before they had eaten their meals. If taken after meals, we find in a large number of cases that there is either contamination or no growth whatever.

Isolation ward.—There is at present only a makeshift isolation ward, a squad room at one end of the barracks being utilized for this purpose. There are no means of isolating cases which are suspicious clinically from those which have positive cultures whether they are clinical diphtheria or carriers. An attempt has been made, however, to keep all cases with positive cultures on one side of the room and all cases which are merely suspicious on the other side of the room. Separate mess gear has been furnished for the two sides of the isolation room and after each meal the mess gear is sterilized in the dish-washing machines in the galley.

We had expected to find instances of cross infection due to the fact that men who did not have positive cultures were forced to live in the same room with men having positive cultures. We have found no such instances to date.

As may be imagined, our facilities for isolation are far from ideal, there being no plumbing of any kind in the room and there being only one portable head in the room for all patients to use.

Separate covered metal cans are kept for waste and garbage.

In an attempt to gain the cooperation of the men, written notices have been posted in all squad rooms directing the men to report to the sick bay at the earliest sign of a sore throat.

In conclusion it would seem that our experience has conclusively developed three important facts of paramount importance in addition to the ordinary measures we have described in the control of the spread of contagion in diphtheria, viz: The absolute necessity of *multiple negative cultures* before a case known to be a carrier of diphtheria bacilli is discharged from observation; the necessity of *restricting transfer of men in and out of infected squad rooms* for a period of time covering at least the incubation period of the disease; and the obtaining of a *final negative culture* on the personnel of the squad room before the restriction is lifted.

To these facts more than to any other factors do we attribute our success in handling what might have been a serious epidemic of a serious disease, with what loss of health to the individual and economic loss to our Naval Establishment, need not be dwelt upon here.

COMMISSARY WORK AT THE UNITED STATES NAVAL HOSPITAL, MARE ISLAND, CAL.

By R. E. WEAVER, Pharmacist, United States Navy.

The purpose of this article is to describe the details of the management of the commissary department of a naval hospital. Many minor points arise, the methods of handling which are not described in the Manual, the Commissary Ledger Instructions, or elsewhere. These matters have to be learned by actual experience, and it is intended to cover them as fully as possible in this article. Some of the methods in force at the Mare Island Hospital may differ in slight details from those at other hospitals, and local conditions at the various stations are bound to result in slightly varying methods.

Provisions are obtained from three sources, as follows: First, directly from dealers with whom contracts are placed by the Navy pay office in San Francisco. These contracts are made for the general service, and also especially for the hospital. The hospital orders

all articles of food, such as potatoes, oranges, onions, general meats, bread, etc., on the same contracts as do ships at this station. In addition to this, certain articles of food which are required for care of the sick and which do not appear on the regular Navy contracts are contracted for by the Navy pay office "for hospital only." Every quarter the Navy pay office is furnished an estimate of the quantities of these items which will be required for the hospital during the ensuing quarter, and contracts are made from these estimates. The contracts are monthly, quarterly and yearly. Eggs, butter, cheese, fresh fruits and vegetables in season are contracted for monthly. Staple vegetables, such as potatoes and onions; fruits, as oranges, apples, etc.; meats, fish, bread and groceries are contracted for quarterly; milk, cream, and ice annually. The Navy pay office sends this hospital a memorandum showing the contractors for the various items, giving the prices and numbers of contracts. In cases of contracts "for hospital only" we usually receive a copy of the contract itself. It is the custom at this hospital to make each month what we term our "Memo. of contracts." On this we group all the contracts, showing first contractor's name and address, telephone, number of contract, and then a complete list of all the items obtainable on that contract, with prices. The object of this will be explained later on. Articles received on these contracts are obtained by placing orders directly with the contractors and are paid for monthly on public bills, the appropriation chargeable being "Naval hospital fund maintenance," or for the present the new appropriation, "Care of hospital patients."

The second method of obtaining provisions is from the supply officer of the navy yard on provision requisitions. The stores obtainable from the supply officer are the dry stores and groceries, such as sugar, flour, tea, etc., and all kinds of canned vegetables and fruits. Requisitions are sent in on the special S. & A. Form No. 30, provided by the Bureau of Supplies and Accounts for the purpose, one white form and eight green copies being sent direct from the hospital to the supply officer. After the requisitions are filled they are priced and constitute their own vouchers, five priced copies being returned to the hospital for the receipt signature of the commanding officer, three receipted copies being returned to the supply officer. At this hospital we used to aim to obtain our provisions from the supply officer once each month, but since the mobilization and our increase in number of patients we have had to send in provisions requisitions twice each month, and sometimes oftener.

The third available source of provisions is the commissary store. Articles required are obtained from the commissary store on signed orders of the commanding officer, using an order blank similar to the one on which provisions are ordered direct from contractors.

From the commissary store it is possible to obtain many items that it would be impossible to get from any other source, such as special cereal breakfast foods, tinned shellfish, preserves, etc., which are useful and very desirable in serving many special diets and for the special messes. Each month the commissary store sends the hospital priced invoices covering issues during the month. These invoices are checked, two copies being receipted by the commanding officer and returned to the commissary officer.

Menus for seven days, from Monday to Sunday inclusive, are prepared each week. We usually make our bill of fare on Tuesday. It has been found very advantageous to work up a bill of fare by first arranging the dinners for each day, starting in with the meats and building around the main dish as we go along. By first deciding what meat to run for each day's dinner, it is easier to obtain a rotation in meats, and it also enables one to work in left-over portions for suppers and breakfasts. After the bill of fare is drafted it is sent to the chief nurse for such additions as may be required for the special diets, and it is then submitted to the executive surgeon and commanding officer for criticism; after approval by the commanding officer it is returned to the commissary officer. Smooth copies are now made in sufficient number for distribution to all who need them—the commanding officer, executive surgeon, chief nurse, diet kitchen, and other kitchens. The orders for provisions necessary to prepare this bill of fare are then made out. The memorandum of contracts above described is referred to and orders are made out to each contractor thereon from whom articles will be required. It is in the preparation of these orders that the memorandum of contracts is found so useful, it being much easier to go completely through a bill of fare, ordering all items thereon by reference to this memorandum, than it would be from the contract memorandums furnished by the Navy pay office on which the various dealers are not grouped together. The orders are mailed from the hospital not later than Thursday night, as some of them go to San Francisco, and they frequently contain orders requiring delivery on the following Saturday. These orders are always subject to change, such as increase, decrease, cancellation by telephone, or otherwise, as the needs of the hospital may change by large increases or decreases in the number of patients.

All provisions are received, weighed, inspected and checked in the commissary department. We keep what we call the "wagon book," which is a rough receipt and expenditure voucher. In this book are entered each day all receipts of provisions, together with actual weights, and a record of whether or not shipments are accompanied by duplicate dealer's invoices. These invoices should accompany each shipment. Weights are checked thereon, corrected where necessary. One invoice is returned to the dealer and one re-

tained for the hospital files. One of our chief difficulties is in getting the contractors to send us these invoices, and where same do not arrive either with the shipment or by mail the same day, we make out and mail to the contractor a receipt showing actual quantities delivered. Every morning the receipt and expenditure voucher for the previous day is prepared, and from this the commissary ledger is posted daily.

The commissary force at this hospital consists of the following personnel: Pharmacist, in charge; one nurse; one pharmacist's mate, first class; one hospital apprentice, first class, or pharmacist's mate, third class; and one civilian storeman. The nurse has charge of the storerooms and ice boxes, superintends the issues and drafts the menus. The assignment of a nurse to this duty has proved most satisfactory. The work is not easy, requiring long training to enable one to master all the details and learn where the biggest "leaks" and the most waste can be located. The nurses are not transferred as frequently as are enlisted men. In two years at this station we had five different chief pharmacist's mates detailed in the commissary department; they seemed to be transferred as fast as they mastered their jobs. This is fine from the point of view of training men, but does not result in the highest efficiency at a given point. Aside from this, it is believed that a trained female nurse, who is practical, is better qualified to manage a commissary department than the average man.

The cafeteria method of serving the convalescent patients' messes and the Hospital Corps' mess, which was described in the BULLETIN about three years ago, has been continued at this hospital and has proved very satisfactory. With proper equipment, including serving tables equipped with steam warming trays, it is believed that this system of messing would be the ideal one for all naval hospitals.

THE PREPARATION OF COLLOIDAL GOLD.

By FREDERICK G. SPEIDEL, Assistant Surgeon, United States Navy, and J. W. SMITH, Assistant Surgeon, United States Naval Reserve Force.

It is the consensus of opinion at present that an examination of spinal fluid is not complete unless subjected to Lange's colloidal gold test, in addition to a Wasserman test, a cell count, a test for increased globulins, and a bacteriological examination.

The purpose of the colloidal gold test is primarily to differentiate paresis, cerebro-spinal syphilis, and meningitis from one another, and as characteristic positive reactions make their appearance very early in the course of an invasion of the central nervous system by these diseases, the importance of the test is apparent.

Up to the present time its popularity has been greatly restricted by the difficulties attending the preparation of satisfactory colloidal gold solutions, and therefore any modification of technique in the preparation of this substance which will give a large percentage of successful results without unduly complicating the process arouses immediate interest.

A great many methods have been suggested for the preparation of this substance, but all workers agree that there are two factors of the utmost importance, namely, the cleaning of the glassware and the absolute purity of the water used.

Some of the methods that have been used in the preparation of colloidal gold are as follows:

Lange's method.[1]—Take 1,000 c. c. of fresh, doubly distilled water, add 10 c. c. of a 1 per cent Merck's gold chloride solution, and 10 c. c. of a 2 per cent solution of K_2CO_3. Heat rapidly to the boiling point, stir vigorously, and add 10 c. c. of a 1 per cent solution of formalin. The colorless solution must at once assume a clear port-wine color.

Eike's method.[2]—Take 1,000 c. c. of fresh, doubly distilled water, add 10 c. c. of a 1 per cent solution of Merck's gold chloride, and 5 c. c. of a 5 per cent dextrose solution. Heat to 90° or 95°, and then add a 5 per cent solution of K_2CO_3, one drop at a time, until the required color is secured.

Oetiker's method.[3]—Believing that failures in obtaining proper solutions were due to variations in temperature and the variable amount of the K_2CO_3 added in Eike's method, Oetiker proposed a modification in which he adds the gold chloride and dextrose solutions as in Eike's method, heats the solution to exactly 90° and without turning off the flame adds at once 12 c. c. of a 2 per cent K_2CO_3 solution.

Miller and Levy's method.[4]—One liter of water is heated to 60 C. in a sterile Jena beaker. At this temperature 10 c. c. each of a 1 per cent aqueous solution of gold chloride and a 2 per cent solution of potassium carbonate are added synchronously and thoroughly mixed at once. From this point the solution is heated as rapidly as possible to between 90° and 95° C. The flame is then turned out and, while the contents of the beaker are briskly agitated, 10 c. c. of a 1 per cent aqueous solution of formalin are gradually added. The previously clear colorless fluid at once undergoes a brilliant reaction, with reduction of the gold to a colloidal state, shown by the production of a beautiful play of colors.

Miller, Brush, Hammers, and Felton's method.[5]—A liter of water is heated to 60 C. and to it are added 10 c. c. of 1 per cent gold chloride solution and 7 c. c. of 2 per cent solution of K_2CO_3. At 80 C., while stirring with a clean thermometer, add slowly 10 drops

of 1 per cent oxalic acid solution. Continue heating until a temperature of 90 C. is reached, at which point the flame is withdrawn and, while stirring, 5 c. c. of 1 per cent formaldehyd is slowly added, a drop at a time.

Work in the chemical laboratory of the United States Naval Medical School indicated that with a very slight modification the above method gave almost perfect results. The modification is in the manner in which the oxalic acid is added. Instead of adding it drop by drop the 10 drops are added at once; the solution is allowed to remain still until a pink or purplish color develops in the area in which the acid falls; the solution is then quickly mixed. The solution has a faint pink tinge and is now raised to 90 C. and the formaldehyd added, as directed. The solutions prepared in this manner respond in an entirely satisfactory manner to the prescribed tests.

Numerous other methods have been described for the preparation of colloidal gold, such as replacing glucose or formaldehyd by other reducing agents, such as metol, hydroquinon, pyrogallol, acids, and others, but it seems that formaldehyd gives the most dependable results. Zsigmondy[6] suggested that a small quantity of a previously prepared colloidal gold solution be added just before the addition of the formaldehyd, the theory being that the tiny gold particles act as nuclei for condensation and grow in the reducing mixture. This method produces beautiful solutions, but solutions which were in no way superior to those made by a method to be described below, and very often were found to be "protected."

A glance at the above methods will show that perfectly satisfactory solutions can be made by a variety of methods and with varying quantities of each ingredient, but no author states that his method will produce other than a "majority" or a "large percentage" of successful results. In order to determine the effect of each factor in the process Black and Rosenberg[7] conducted a series of experiments, using the method of Miller, Brush, Hammers, and Felton[5] with the exception of one factor—all other conditions remaining constant—and variations of this one factor were used to determine its influence on the character of the solution.

Reducing their observations to a basis of 1,000 c. c. it was found that the amount of 2 per cent solution of K_2CO_3 could be varied from 6.25 c. c. to 7.25 c. c. and still obtain beautiful solutions without shimmer and neutral in reaction. Likewise they found that the 1 per cent formaldehyd solution could be varied from 4.5 c. c. to 20 c. c. with similar good results. The method of heating was found to be of great importance. If heating has been slow and the formaldehyd is added before the boiling point is reached, vaporization of

the formaldehyde will be excessive, resulting in incomplete reduction and alkalinity.

In view of the above, it was believed that the method of preparing colloidal gold solutions in use at the United States Naval Medical School could be greatly simplified and still maintain a high percentage of good results. Therefore after a large number of trials we have adopted the following method, which we give in detail, as we believe that by carefully following the directions, satisfactory solutions can be prepored at any naval hospital laboratory.

Glassware.—New glassware should be used, and, of course, should not be used for any other purpose. It is first cleaned with hot soapy water and then rinsed with aqua regia. After this all flasks, pipettes, etc., are competely filled with tap water several times to drive out all traces and fumes of aqua regia and then rinsed with distilled water, and just before use with triple-distilled water. We found that the following glassware is all that is necessary in the preparation of colloidal gold: Three 100 c. c. volumetric flasks, one 100 c. c. pipette, one 10 c. c. pipette, one 10 c. c. graduated pipette, one 5 c. c. graduated pipette, and several 2-liter Erlenmeyer flasks. The pipettes should be reserved for only one solution each and they should not be interchanged. If this rule is followed, a simple rinsing with triple-distilled water before making each solution is all that is necessary, and the initial cleaning with aqua regia need only be repeated at long intervals.

Water.—All water used in the preparation of the stock solutions and the reagent itself must be triple distilled. A block-tin condenser is used, and rubber connections must be avoided. A very satisfactory condenser can be made from a piece of block-tin tubing about 60 cm. long bent in the form of an inverted U, with one long arm and one short arm. The short arm is passed through a tinfoil-covered cork into the distilling flask and the long arm is surrounded by a glass or metal cooling jacket, through which water circulates. The lower end of the tube is passed into a flask placed to catch the distillate.

To the second distilled water is added a small quantity of sodium carbonate (about 1 gm. per liter). We believe this to be very important, as it frees the water from all traces of ammonia that may be present due to absorption of the gases in the laboratory and, as a further precaution against impurities, the first 50 to 100 c. c. of the third distillate is discarded.

Solutions required.—1. Gold chloride (Merck's) 1 gm., water (triply distilled), up to 100 c. c. 2. Potassium carbonate, 2 gm., water (triply distilled), up to 100 c. c. 3. Formalin (40 per cent formaldehyd), 2.5 c. c., water (triply distilled), up to 100 c. c.

Preparation of the colloidal gold solution.—Place 1,000 c. c. of triply distilled water in a 2-liter Erlenmeyer flask. (A large flask facilitates vigorous agitation at the end of the procedure.) Add 10 c. c. of 1 per cent gold chloride solution and 7 c. c. of 2 per cent potassium carbonate solution. Place over a Bunsen burner and heat rapidly to boiling. When the boiling point is reached, as evidenced by the rising of bubbles, remove from the flame and with constant agitation add 4 c. c. of 1 per cent formaldehyd (2.5 per cent formalin) solution. Continue to agitate vigorously and the solution will be seen to assume a faint bluish tinge and pass rapidly through a deep amethyst to a beautiful red color, which indicates that reduction is complete. This is the final product, and it should conform to the following requirements:

1. The solution must be absolutely transparent and preferably of a brilliant red-orange or salmon-red color.

2. Five c. c. of the solution must be completely precipitated by 1.7 c. c. of a 1 per cent solution of sodium chloride in the time interval of one hour.

3. The solution must be neutral in reaction.

4. It must give a typical reaction with a known paretic cerebrospinal fluid.

5. It must produce no reaction greater than a No. 1 with known normal cerebrospinal fluid.

If a solution results that is unsatisfactory in any of these particulars, it should be discarded, and, after a careful and thorough recleaning of all glassware, another solution made up. This procedure, in our experience, has always resulted in a satisfactory solution, and takes less time and is less trouble than trying to "correct" a poor solution.

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HISTORICAL.

THE MEDICAL SCHOOL OF SALERNO, 848 A. D.–1811 A. D.

Eleven leagues south of Naples the ruins of an old Norman castle look down upon one of those deserted, neglected, provincial towns so common throughout Italy, which, though half forgotten now, wielded in their day an influence that reached to the confines of Europe. The town walls have been replaced by a public promenade, and the fine harbor constructed by John of Procida in 1260, though cleared now of obstructing sand, is visited only by fishing smacks and excursion steamers. The lion of the place is its cathedral, dedicated to St. Matthew, whose bones were brought here from Paestum in an age when lies, theft, and murder were none too big a price to pay for much coveted sacred relics; when the fierce struggle for such possessions exceeded anything that later generations can show, even among collectors of stamps, coins, porcelains, or old masters. The church was begun by Robert Guiscard, as a compensation, perhaps, for the damage done to the town after his eight months' siege or else to add to the beauty and dignity of the capital of his new dominions, and it was consecrated by the immortal Hildebrand in the days when he was supreme and little dreamed that for having "loved justice and hated iniquity" he would one day come back an exile to die and be buried in Salerno.

Salerno was founded by Rome in the second century B. C., as a bulwark against the Picentini. In the Social War it was captured by the Samnites. It began to assume real importance during the Lombard invasion. After the death of Charlemagne, who had dismantled it, the town rose again stronger than ever, and became, owing partly to its extensive fortifications, a powerful principality, rivaling Benevento and able under its Lombard princes to withstand more than one attack of Saracen pirates.

De Renzi[1] says: "Everyone knows that the Goths who came to Italy in the fifth century left largely undisturbed the ancient civilization of these unfortunate people; the Longobards alone, Germanic in race, brought with them destructive barbarity. However, the Longobards were not able to flood the whole of Italy, and some cities either remained Latin, as did Rome, or Greek, as did Naples. * * * The

[1] Storia Documentata della Scuola Medica di Salerno, G. Nobile, Naples, 1857, p. 101.

people of Salerno, having preserved their independence of Lombard dominion for 76 years were able to maintain their institutions, their schools, their Latin customs * * * Little by little Italian civilization softened the Longobards as their fury began to be spent * * * It is in this way that Salerno which only passed into the possession of the Longobards after this metamorphosis had taken place was able to retain so great a portion of its Latin culture." Its civic power waned when Henry VI sacked it and transferred the court to Palerno. The first Napoleon closed its university and so severed the last link which bound Salerno to "the glory that was Greece and the grandeur that was Rome."

But Salerno still possesses what neither the Teuton invader nor the tooth of time can take away, a beautiful location and a salubrious climate. The guide-books assure us, too, that good wine is produced in the neighborhood.

Appulus (180 A. D.) writing in verse says: "There is no pleasanter city of Latium than this one, abounding with fruits and trees and wine; not lacking in apples and nuts. It has beautiful buildings. Striking women and upright men adorn it. Standing half on the hill and half on the plain, it is supplied with everything by land and sea."

Gilles de Corbeil was full of tender memories of his alma mater. His writings abound with references to the college and throw many sidelights upon the character and work of the school. He speaks of Salerno as sacred to Apollo and the faithful guardian of Minerva. He extols the beautiful site of Salerno, washed by the waves of the sea and climbing the hillside, rich in herbs, marvelously powerful to heal. He refers to the physiology and anatomy taught there; describes the system of instruction; mentions public lectures by the faculty, and describes the solemnities connected with the conferring of degrees.

It may be in large measure due to the location and climate that there developed at Salerno a medical school which has a permanent place in the history of human progress. The exact date of the founding of this institution is unknown, for the reason perhaps that no pope or emperor created it by fiat, but that it gradually came into being, a product of local needs and conditions.

De Renzi states that the origin of the school of Salerno is "as obscure as the sources of the Nile." He denies emphatically the suggestion that the school owed its origin to Arabian or Saracenic influence, pointing out that in the early period the only contact was with Saracens of rough, piratical type, and not with the cultured Moors; and he is at some pains to disprove the assertion that the school was organized by Constantine Africanus. He places the birth of the school at the middle of the seventh century. The earliest physician

alluded to in connection with the school of Salerno is Joseph, A. D 848. In the manuscripts of his day he is styled *Iosep Medicus.*

Daremberg[1] says that the texts of the tenth and eleventh centuries already referred to the school as very ancient. The Neapolitan archives furnish names of Salernitan physicians as early as 846 A. D. He admits, as De Renzi claimed, that Salerno did not begin as a guild nor as a secret society, and also corroborates De Renzi's assertion that it had a lay origin, though owning that the influence and assistance of the Benedictines of the neighborhood was considerable.

From very remote times people went to Salerno for their health. As early as the close of the seventh century a monastery was established there by the Benedictines, and, if not directly organized by them, their presence and their rule of charity and good works prepared the way for the college. In 820 A. D. a hospital was built at Salerno, and the members of the order had a share in the control of other benevolent institutions that gradually grew up around it, among which may be mentioned the large infirmary of the Sisters of St. George.

A powerful impulse was given to hospital construction by the Crusades, and in the course of time there were at lease five hospitals in the city, one of which was administered by the Knights of St. John of Jerusalem. Sufferers were thus attracted to Salerno, and naturally physicians of ability began to settle in so promising a field. By the close of the ninth century Salerno was already famous for its physicians, some of them being originally from remote parts of the peninsula, as was true in the case of Ragenifrid of Lombardy, the medical attendant of the Prince of Salerno. Patients of distinction now flocked to Salerno from all over Europe. Bishop Adalberon in 984 A. D. sought health there in vain, but Desiderius, Abbot of Monte Cassino, came and was cured by Constantine Africanus. A warm friendship sprang up between these two great men, one of whom became a pope with the title of Victor III, while the other eventually retired from Salerno to enter the monastery of Monte Cassino and there continue his labors both as healer and writer. Duke Guiscard sent his son, Bohemund, made famous by Tasso, to Salerno to be cured of a wound received in battle which had refused to heal under the ordinary surgical treatment of the time. The Duke of Normandy, later known as William the Conquerer, spent some time at Salerno for a similar reason. Some authorities insist that it was not William but his son, Robert, who sought healing from the wise physicians at the famous seat of learning. Legend and romance cluster around the visit of Robert of Normandy to Italy. It is accepted as a fact that he went there and was suffering at the time

1 Introduction to C. M. St. Marc's "École de Salerno," Baillière, Paris, 1880.

from a fistula and a chronic discharge due to a poisoned arrow. It is scarcely to be believed, however, says De Renzi, that the wise doctors of Salerno would declare that a cure could not be obtained until the poison had been sucked from a wound of such long standing, and we must reject the pretty story of how Robert generously forbade such an attempt on account of the danger to the sucker, and how his beautiful young wife took advantage of an occasion when the duke was asleep to perform this heroic cure at the expense of her life. This and other stories seem to have grown up through an attempt to explain the origin of the dedication to the King of England of the famous "Regimen sanitatis Salerni."

The ancient chronicles of the city ascribed the actual founding of the Salerno school to four doctors, a Jew, a Greek, an Arabian, and a native of the town, who lectured, each in his own language. This origin is doubtless mythical but lends weight to the modern opinion that the medical school had its actual beginning in lay rather than clerical sources.

By the eleventh century a regular medical curriculum, with standard requirements, was in full activity, and Salerno had become the medical center of Europe. Not only did patients flock thither, but quacks and charlatans came as well, ready to profit by the ignorance of patients or the failures of the recognized luminaries in the profession. It became necessary to protect both the sick and the regular practitioner from the fraudulent claims of such parasites. In 1140 A. D. we find Roger II of Sicily promulgating a law to regulate the practice of medicine in his dominions. He required an examination by officials and judges. Anyone attempting to prescribe without proper license was liable to a year's imprisonment and the confiscation of his property. A century later Roger's grandson, the illustrious and learned Frederick II, required candidates for a license to undergo a public examination by the faculty of Salerno. The examination covered the teachings of Hippocrates, Galen, and Avicenna. No one was eligible for the examination unless he had enjoyed three years of premedical instruction, four years' study of medicine, a year's instruction under a licensed physician, and a year's special study of anatomy in case he desired to specialize as a surgeon. The enactments of the great Hohenstaufen ruler fixed the fees for office and house calls and also undertook to regulate the drug trade by defining the relation of doctor and druggist, creating inspectors of drugs, etc. A far more radical and significant feature of Frederick's law was the provision for the dissection of a human body before the assembled faculty and student body at least once in every five years. On the other hand, De Renzi claims that no edict of the time of Frederick II provides for dissection once in five years, as has frequently been stated, but that this monarch merely legalized the dis-

section of the human body. If the practice was rare it was due to the difficulty of obtaining material for dissection and Salerno should be credited with the distinction of having made a beginning in this essential branch of medical education.

However little of positive progress in medicine and surgery we may be willing to ascribe to the school of Salerno, we are already in a position to recognize that it accomplished two things. It bridged the gap between the decline of Greek and Roman medicine and the period of distinct advance in the fifteenth and sixteenth centuries. More important still, it emphasized the need, which, according to modern notions, it may indeed have supplied in but a limited measure, of adequate study and preparation before venturing to minister to the ills of the flesh. If disposed to minimize the actual professional attainments of the Salernitan school, we should remember that it is only within the last decade that premedical education has been generally insisted on in our own country. The school of Salerno stood for the best scholarship possible in its day and aimed to turn out men who had developed habits of thought and observation and powers of reasoning and were able to meet on a footing of intellectual equality the best-born patient who might seek their services, and it was for three centuries the great source for the dissemination of medical lore throughout Europe.

There are other respects in which Salerno has a right to command the admiration of this generation, which we deem to be characterized by liberality of spirit and a strong trend away from unnecessary dosing. Until the Salernitans came under the sway of the Arabian school hot and cold baths, heat and cold, fresh air, diet, exercise, and simple therapy were preferred to complicated pharmaceutical remedies, though they had an extensive materia medica, which included iron for enlargement of the spleen and sea sponge for goiter. Salerno must be credited, too, with careful, honest observers and recorders of natural phenomena and a forceful simplicity and directness in marked contrast with the scholasticism and pedantry of Arabia. The Salernitans have left us worthy descriptions of intermittent fever, pneumonia, psoriasis, lupus, and phthisis. In the treatment of incipient phthisis they recommended an easy life in the open air and appropriate diet.

Peter Musandino, 1160, writes about the preparation of appropriate food and drink for the sick, a matter we consider so important to-day, and which has for its practical exponent the diet kitchen found in every up-to-date hospital.

When the diet nurse of to-day puts the climax to her culinary endeavors by serving the carefully planned meal on a dainty tray whose mere appearance shall stimulate the patient's flagging appe-

tite, she is only carrying out the ideas elaborated eight centuries ago by this wise clinician, who insisted on the value of dishes and crockery that pleased the eye. Musandino appreciated the psychic element in treatment and knew full well that the sick must often be humored and cajoled. If a patient was really going to be injured through chagrin and disappointment at not having the accustomed wine with his meals, Musandino gave him a substitute for wine undistinguishable to the taste from the objectionable alcoholic and he generously supplies to his readers the formula for its preparation. Merely to read, during the course of a long day's research amid library shelves, his description of a boneless chicken in jelly would stimulate the salivary glands of the veriest bookworm.

Once again we are compelled to recognize that the Salernitans were working on sound lines, though their actual results may harmonize little with our modern conceptions. Corbeil refers to Musandino as an authority of great learning and high standing.

The Salernitans appreciated the unfavorable prognostic to be derived from the supervention of chronic diarrhea in phthisis. The employment of wine as a topical application for open wounds shows a practical if empirical attempt to render wounds clean. It is remarkable, as noted by Dr. Walsh, that, in a country where the heating of dwellings has never been in vogue, the necessity of a warm and unirritating room temperature was insisted on for sufferers from pulmonary affections. There has been a disposition to belittle the surgery of Salerno, reserving any encomiums for the work accomplished strictly to medicine, yet, from the circumstance that both sutures and ligatures were advocated there for the arrest of hemorrhage, we must conclude that the subject was far from neglected.

In a work of Peter Clericus (A. D. 1035) appear these words: "If too much blood shall have been poured out and consequently the man become exhausted, you will tie the vein itself and wash with wine and water * * * and by means of a needle you will draw a double thread under the vein itself and thus will tie in two places the vein itself; and then cut between the two ligatures."

Dr. J. J. Walsh in his entertaining work Old-Time Makers of Medicine (Fordham University Press, New York, 1911) explains very logically how these measures would come into use and be discarded again and again. In the absence of antisepsis and asepsis, infection was a frequent accompaniment of wounds, with resulting secondary hemorrhage and its deplorable consequences when vessels were tied. The actual cautery, on the other hand, was a clean hemostat.

Here and now in America, when women are acquiring suffrage rights, seeking not only higher education and a wider sphere of activity in intellectual fields but political power and participation

in the public life of town, community, and state, we can not fail to recognize how far in advance of its time was Salerno in opening its doors to women. They were eligible for the doctorate and for license to practice, not only in a special field but in all branches, even surgery, if they so elected. This was in accord with precedents established by Greece and Rome, as we know from inscriptions and manuscripts and the allusions of ancient writers, both lay and medical. The name of more than one "lady doctor" of eminence has come down to us, and of all the "sweet girl graduates" of Salerno none attained greater fame than Trotula, who flourished about the middle of the eleventh century. She appears to have been at the head of the women's department, and the author of at least two works dealing mainly with obstetrics and gynecology. In them are found directions for the prevention of perineal lacerations, for the treatment of procidentia uteri, for the operation of perineorraphy, etc., and rules for the hygiene of the puerperium, the selection of a wet nurse, as well as for the routine management of labor. She wrote, too, on the removal of freckles, and about how to get rid of superfluous flesh, and other matters of moment to women. The sufferer from increasing embonpoint was advised to take sand baths on the seashore under the rays of the noonday sun.

Trotula's reputation became coextensive with Europe, and the magic charm that attached to her name endured for 200 years. She was married to Platearius, a medical writer of note, and had a son and a grandson in the medical faculty of Salerno. Among the women who followed her were many capable practitioners and writers. They discussed such subjects as "Crisis," "Black Bile," "The Cure of Wounds," "The Embryo," "Urine." Salvator Calenda, dean of the faculty in 1415, later professor in the University of Naples, had a daughter, Constance, who is mentioned not only for her beauty but as having distinguished herself by the unusually high marks she obtained in her examinations in medical subjects at Salerno. These Salernitan dames were not without a spirit of mischief and fun, and sometimes put their learning to uses scarcely professional, as when they powdered roses with euphorbia and gave them to young gallants to smell with a view to enjoying the violent sternutations that resulted.

Up to the end of the eleventh century the masters of Salerno were without competitors except among the clergy. From then on we find a growing disposition on the part of the church to forbid the practice of medicine by the clergy. Such practice had begun as a charity, but had become increasingly indulged in because of the emoluments acquired and the increased liberty which it permitted. The church realized that the systematic practice of medicine diverted priests and monks from their legitimate religious work. Attention

was given to this matter by the Council of Rome, by the Council of Rheims (1135), the Second Lateran Council (1139), the Councils of Montpellier (1172), Tours (1172), Paris (1212), and the Lateran Council of 1215 (III).

The decay of Salerno began with the growth in political importance of Palermo and Naples, and it ceased to set the standard for things medical after the medical school of Bologna came into prominence through the native genius of Hugo of Lucca, a man whose lack of erudition was counterbalanced by originality and industry. Hugo was followed by Theodoric and other men of a like stamp, and, northern and central Italy having become infused with new ideas from Arab sources, Bologna rapidly forged ahead in popular favor while Salerno came to be regarded as stagnant and effete. Though the schools of medicine at Naples, Montpellier, Bologna, and Paris grew to be rivals of the school at Salerno, and finally threw it completely in the shade, the effect of Salerno's liberality toward women left a permanent impress upon Italy, where learned women were numerous and conspicuous even before the Renaissance, before the days of Isabella d'Este and Vittoria Colonna. Bologna replaced Salerno as the center for professional study for women, and counted in its faculties of medicine and law many a soft-voiced teacher of talent and renown. Among them one had, in addition to learning, a face so beautiful that it was deemed expedient to have her lecture from behind a curtain!

It was at Bologna under Mondino that the study of human anatomy was systematized and assumed its proper place in the medical curriculum, though both at Salerno and Venice the importance of this subject had at least been recognized. At Bologna the enthusiasm for anatomical research reached a high pitch. The regulations of the university required the teachers to "dissect for students if they acquired a body for that purpose." In 1319 four students, one from Piacenza and three from Milan, were arrested and tried for body snatching. They had gone to a cemetery outside the city gate, disenterred, and removed the body of a criminal executed a few days before.

A slight diversion may be permitted here to advert to a pathetic little romance which sheds its sweet fragrance over the dry chronicles of the fourteenth century. Among Mondino's assistants were Alessandra Giliani and Otto Agenius. The former began her university career by a study of philosophy and then specialized in anatomy. Her skill won her the position of prosector. She had the reputation of being able to "cleanse most skillfully the smallest vein, the arteries, all ramifications of the vessels without lacerating or dividing them, and, to prepare them for demonstration, she would fill them with various colored liquids, which, after having been

driven into the vessels, would harden without destroying the vessels. Again, she would paint these same vessels to their minute branches so perfectly and color them so naturally that, added to the wonderful explanations and teachings of the master, they brought him great fame and credit." This rare maiden died in her nineteenth year of too strenuous application to her work, as evidenced by the commemorative tablet set up by her fiancé and associate under Mondino, Otto Agenius, the first assistant in anatomy, a man of unusual ability and zeal, who himself died suddenly at about 30. The epitaph describes him as left inconsolable by the taking away of "his better part and excellent companion."

But to return to Salerno. Here anatomy had been taught, mainly by dissection of pigs, and Copho's Anatome Porci was a well-known book in its day and served as a sort of compend of dissection. Copho was a Jew, and this race gave not a few teachers of distinction to Salerno, a circumstance which illustrates the enlightenment and liberality of the Civitas Hippocratica.

Another work emanating from Salerno which had great vogue in its day was a rhyming Latin poem, a compendium of suggestions on health, the "Regimen sanitatis Salerni" or "Schola Salernitana," ascribed perhaps erroneously to Joannes de Meditano as author.[1] It was intended for the laity and dedicated to a "King of England" about whose identity there has been no inconsiderable discussion, and was first edited and published by Arnold of Villanova in the thirteenth century. Of the popularity of this work we may judge from the fact that it was translated into almost every language of Europe and went through 240 editions between 1484 and 1884. There are at least 100 extant manuscript copies of the work. In the library of the Surgeon General of the Army in Washington there is a whole shelf devoted to copies of the printed work, the most ancient of which dates to 1507. In the opening lines of this classic we see a reflection of the eclecticism and liberality as well as the good sense and simplicity which marked the best period of Salerno. There is a hint of modesty, too, always lamentably rare except in the very ablest and noblest representatives of the profession. The tyro who complains that Osler's Practice of Medicine, which has been the model for so many later works, is deficient in the matter of treatment would perhaps see nothing charming or fine in the words:

> Si tibi deficiant medici, medici tibi fiant
> Haec tria: mens laeta, requies, moderata diaeta,

[1] The authorship of the Regimen Sanitatis has also been ascribed to John of Toledo, who is supposed to have epitomized an earlier composition and dedicated it to a Spanish princess. In some texts the dedication of the Regimen is to the King of the French, in others to the King of England.

which might be translated:

Should a dearth of doctors be
Let thy healers be these three:
Happiness and lasting quiet
And an ever moderate diet.

Still another book, the output of Salerno, always a prolific source of medical literature, is entitled "The Coming of a Physician to His Patient, or An Instruction for the Physician Himself," which gives valuable suggestions for the development of the proper bedside manner, as vital a detail to-day as it was when the unsuccessful physician was liable to mutilation or imprisonment at the hands of a patient of high degree unless he had won that patient's personal regard. The author must have been a strong believer in suggestion and have appreciated fully the rôle of the depressing emotions, for he urges the wisdom of having the patient confess and receive the sacrament before the physician's visit, lest, if these important steps were taken after it, the sick man should assume that an unfavorable prognosis had been given. The doctor is enjoined always to assure the patient of his recovery, even when it is necessary to speak less hopefully to relatives and friends. It is directed that on the way to the sick man's dwelling the messenger who summoned the doctor be questioned about all the details of the case, so that, even if a study of pulse and urine fail to supply a diagnosis, the sufferer may be duly impressed by his attendant's ready grasp of all the symptoms. The learned Trotula also had an eye to business or could not quite vanquish feminine proclivities, for she inserted in one of her books a chapter on cosmetics.

Among the justly famous alumni and professors of Salerno was Gilles de Corbeil, better known as Aegidius Corboliensis, a popular writer on medical topics, already referred to, who was partial to verse and employed hexameters as his vehicle of expression. His poems on the urine (sic) and the pulse were long regarded as medical classics. We are not surprised to learn that a man of his refined taste eventually became court physician to Philip Augustus, of France.

The art of preparing drugs had reached a high degree of complexity at Salerno, even when the general plan of treatment was mainly dietetic. Nicholas Præpositus, a master of the school at Salerno and at one time its dean, who flourished in the middle of the twelfth century, was the author of a compend of pharmacy, the Antidotarium, officially recognized and used in Salerno for centuries. It contains what is probably the first extant reference to anesthesia produced by inhalation for undergoing operations. The device in question was spoken of as "the soporific sponge." A

sponge was saturated with the juices of opium, hyoscyamus, mandragora, lettuce, etc., and then thoroughly dried. Just before applying it to the patient's nostrils the sponge was steamed or dipped in hot water. The Antidotarium was among the earliest of printed books, appearing in German in 1472 and in Latin in 1480.

If the fame of Salerno had markedly declined by the middle of the fourteenth century, its influence was still strongly felt in southern Italy, during which period we find a master of this school attaining a position of prominence as a writer and sanitarian—one Saladin of Ascoli. Saladin addressed a memorial to the Prince of Tarentum, whose physician he was; a little work on the subject of druggists and compounders of medicine, in which he refers to the official treatise on drugs by Nicholas Præpositus. He claims to have written at the instance of many druggists, and deplores with them the ignorance which prevailed in that branch. His work describes in detail the method of weighing and determining the dose of drugs, gives a list of what may be called the official preparations, outlines the examination which druggists should be able to pass in order to be licensed, speaks of the method of gathering plants, flowers, roots, etc., and of the appropriate seasons and months for so doing, telling how they should be preserved and put up and, finally, describes the proper method of installing and conducting a drug store. In summing up his description of an ideal dispenser, Saladin says that he should be not too young and not given to women, wine, or gambling; he should be studious, attentive, upright, kind to the poor, learned, and full of the fear of the Lord; he should not be too keen for gain, but consider that he has in his hands not only the reputation of physicians, but the lives of their patients; he should not dispense poisons nor sell drugs intended to bring on abortion; he should be sure that the prescription conforms to the intention of the physician who wrote it, and, if it contains dangerous or bad-tasting ingredients, he should consult with its author before putting it up; he warns him against substitution, and against selling articles which have been kept on his shelves too long and have become inactive, such as hard, insoluble pills. In all this, Saladin appears to have followed the traditional teaching of the school of Salerno.

The Salernitans were always men of learning; they were often of good family; were employed for the performance of civic functions of the highest order, and had the full confidence of the rulers of their day. Matthew Solomon (twelfth century), a Jew, a master of Salerno, was called to a professorship in the rising school of Montpellier. Romualdo Guarna (twelfth century) served as foreign ambassador; sat in the general Lateran council, 1179; accompanied Pope Alexander, and represented William I at the draw-

ing up of the treaty of peace with Frederick Barbarossa. He was elected Archbishop of Palermo. He was twice called upon to treat the King of Sicily in Palermo. He ascribed the death of the King to the patient's intractability—"he took only the medicine which appeared to him appropriate." Romualdo was famous for his medico-legal knowledge and was called on for expert investigation and testimony in a famous poisoning case. He wrote a history of the world from the creation to the year 1178.

Another Jewish physician of note was Ferraguth, a native of Messina, physician to Charles I of Anjou.

John of Procida was born at Salerno about 1210. He was intimately associated with Frederick II, serving as his physician for about 10 years, and was tutor to Manfred. He attended Frederick in his last illness. John suggested improvement of the port of Salerno and established an annual fair which continued to be held down to the present era. After the battle of Benevento, John is believed to have practiced medicine in Rome. During his sojourn there he cured Cardinal John Gaetani (later pope with the title of Nicholas III). He attended the ruling pope, Clement IV. He is believed to have taken part in the battle of Tagliacozzo, 1268, when Conradin was defeated by Charles of Anjou. We next find John of Procida at the court of the King of Aragon, where he entered the service of Constance, daughter of Manfred, who had married Peter of Aragon. When Peter succeeded his father on the throne of Aragon the acquisition of Sicily began to be seriously considered and John of Procida became one of the prime movers in this undertaking and devoted the remainder of his life to furthering the political interests of Manfred's daughter, Constance, and of her husband and children. We find him making repeated journeys between Italy and Spain, sometimes disguised as a monk, personally invoking the aid of the Emperor at Constantinople and of the Pope in Rome, plotting in Naples and Sicily, and present in the latter country at the time of the Sicilian Vespers in 1282. He played the part of the statesman while the famous admiral, Roger di Lauria, represented the military arm of Aragonese enterprise. John of Procida died at an advanced age (88?). He was the author of one or more medical works, which have been lost, and of two medical formulas which continued to be widely employed in Italy for four or five centuries.

Mention should be made of the Salernitan, Marzianus, the favorite physician of Frederick II when still a young man. It is believed that it was at the instance of this physician that Frederick put forth his well-known enactments regarding the study and practice of medicine in his dominions.

The famous astrologer and physician, Michael Scott, who lived at the time of Frederick II, and is referred to by Dante, etc., is believed by some authorities to have been a pupil of the Salerno school and to have practiced medicine in the Kingdom of Naples, on the strength of his many references to southern Italy and of the fact that the name Scotto was not an uncommon one at Salerno during his period.

The use of staphysagria delphinium for pediculosis capitis is recommended in the Catholica of Master Salerno, who flourished at the close of the twelfth century. He appears to have been the author of four works, two on thereapeutics, one on surgery, and the Caholica. All but the latter have been lost.

The Catholica has paragraphs devoted to a large variety of subjects. In regard to headache it is explained that the cause may be local or general, and in the latter case hard to determine and remove. The author associates different forms of headache with congestion or pallor or jaundice, torpor of the liver, etc., and takes into consideration the character of pulse and urine. He gives a description of epileptic attacks, and, under treatment for this disease, mentions production of emesis, catharsis, a low diet, scant in meat and fat, the avoidance of excitement and disturbing emotions.

In discussing stone in the kidney and bladder the author says that the physician must determine the source of the blood in hematuria; that if blood comes first and urine afterward, the source is the bladder. If the urine comes first and then the blood the latter represents hemorrhage in a remote organ. If blood and urine are thoroughly mixed, the bleeding is from the region of the loins. The causes of abortion are classified. Wine is recommended for local application to wounds. Fistulæ which do not heal with simple treatment should be cut in their entirety. The Catholica contains elaborate pharmaceutical directions and references to many remedies. It is to be noted that "aqua pluvialis" is invariably ordered in compounding. When under the head of threatened abortion, after discussing the various features present in the urine, he advocates reducing the diet, he shows himself the prudent and discerning physician by adding that this should not be as freely done as if the patient were not pregnant. Again, when prescribing venesection, he reminds the reader that the amount of blood abstracted must be proportioned to age and strength of the patient.

That Dr. Salerno had a sublime faith in the virtues of his pharmacopoeia may be judged from his furnishing a formula "ad vulvam restringendam ut virgo videatur mulier." A human and masculine note appears in the apparent slur on the lady practitioners of his vicinity, contained in the words "De omne ornatu faciei secundum notitiam salernitanarum mulierum que multum indigent."

At the beginning of the fourteenth century a work entitled "Glossæ Quatuor Magistrorum" began to be extensively quoted and referred to by medical writers of that time. It is nothing more than a series of comments on the work of Roger, surgeon of Salerno. This work has been the subject of much discussion, but it would appear reasonably certain that it was originally corrected and published by Guido di Arezzo. The four masters were probably the four regents of the school of Salerno who had seen fit to put forth in manuscript form a summary of the surgery of their school, of which Roger was the chief exponent. Roger belonged to a distinguished family of Salerno frequently mentioned in the city archives in the eleventh and twelfth centuries. There has been much confusion and discussion about his identity and time. His work is marked by originality and courage.

Roger was an astute observer of character as well as of the materies morbi. He refers to the difference in the requirements of rich patients and poor ones, and suggests modifications in the doctor's conduct to suit each class, though in no spirit of contempt for the destitute. He describes the rich as being delicate and fastidious and desirous of recovering in comfort and luxury. The poor, on the contrary, have little money to spend and care not for the taste of a medicine, provided it will enable them to get back to their work promptly. Therefore, the inexpensive and drastic remedies are for them. Their sirups may be made from honey, while the well-to-do will require sugar.

He treated quinsy by rupturing with the finger or by incision and believed in keeping open penetrating wounds of the chest to avoid collections of blood and pus. In wounds of stomach or intestine he advocated suture with thread; for the latter, suture over a tube of elder bark (sambucus nigra), which has hydragogue and cathartic action. In malignant tumors of the cranium with caries of bone, he used the trephine, and boldly removed the tumor with all its attachments. Roger was the author of a treatise on venesection. He showed marked ingenuity in the treatment of arrow wounds and laid great stress upon the danger of lacerating the tissues by the incautious extraction of barbed arrows. His practice was to endeavor to cut off the barbs by the use of forceps introduced along the shaft of the arrow or else by passing a metal tube of sufficient caliber to include the barb to the bottom of the wound and then withdrawing tube and arrow together, like a cannula and its trocar. He describes three varieties of fistula. In treating hernia of the lung, he avoided enlarging the wound for fear of damaging the lung tissue, and employed the following method of reduction: Traction was made on the skin above and below the hernia; the skin was drawn over the hernia and gentle pressure applied, patient being in the

erect position. At a given signal the patient was directed to sit down rather quickly in the hope that the jar thus produced, combined with external pressure, would effect reduction. Roger was reputed very successful in the performance of lithotomy, in which he followed closely the directions of Celsus. He lived at a time when Italy had become an important center for all the movement of large bodies of men connected with the Crusades. The shipping of Genoa, Venice, and Pisa afforded transportation to the Crusaders, who often spent considerable time in Italy, both on their way to and returning from the Holy Land. They came back sick and wounded and often brought with them marvelous accounts of the work of Saracen surgeons and physicians, and new methods, new instruments, new remedies.

Bruno of Longoburgh lived a little later than Roger, but surpassed him in originality and achievement. He based his writings and practice not only on the work of Greeks and Arabians, but on the result of his own observations and experience. He considered wounds with regard to their size, shape, situation, and depth, and held that the first indication for treatment was the arrest of hemorrhage, next the production of suppuration (what we would call drainage and flow of lymph), and, third, the regular and compact regeneration of tissue. He writes with great accuracy of the treatment of fractures and dislocations. He discards the barbarous mechanical devices of the time for reducing luxations, preferring the arm of a vigorous assistant. He is the first among Christian surgeons to discuss castration, and prefers in this operation the knife to compression. Bruno marks the period of transition from the tenets of the conservative, classic school of Salerno to the more progressive and eclectic school of Bologna, represented in its first period of fame by Hugo, Theodoric, and others.

With the introduction of Arabian influence into the practice of medicine in Italy there was a disposition to regard the manual operations of surgery as beneath the dignity of a learned physician, but this tendency was opposed by the energy and individuality of such men as Bruno, Hugh, and Theodoric. In spite of them, however, we know that for a long time after them surgery as a handicraft fell into the hands of barbers and ignorant men. The tendency of the Arabian school was to treat surgical affections medically. How different this idea from that which prevailed at Salerno, where a whole year of additional study was required from those who desired to specialize in surgery.

From the time of Frederick II and through the period of dominion by the houses of Anjou and Aragon frequent laws were passed which related to hygiene and sanitation in the Kingdoms of Naples

and Sicily. While giving due credit to the broadmindedness and energy of Frederick and his successors, a consideration of how such enactments are secured in our own day justifies us in ascribing these laws to the influence of the school of Salerno, through its many representatives at court and through masters of that school everywhere held in high esteem for their integrity and learning. As an example of the precautions taken as early as the middle of the thirteenth century for the prevention of the spread of disease and for the preservation of the "purity of the air" we find that there were specific ordinances in regard to the depth at which bodies should be buried and in regard to the disposition of refuse and the bodies of dead animals. Anyone who has had the misfortune to pass to leeward of a place where hemp was being macerated will not be surprised to find that the laws of Frederick II stipulated very precisely where and how this operation should be conducted. There was a fine for macerating hemp within the limits of a city or too close to a military camp. There were laws (apparently somewhat obsolete now in southern Italy) against throwing garbage into the streets or from windows, and there were strict regulations in regard to the keeping of hogs within city limits, particularly during the months of summer. Barbers and bleeders were forbidden to operate in the public squares and streets and were required to be very careful as to the manner in which they disposed of hair and blood. In the fourteenth century special statutes were drawn up in certain towns in regard to the slaughter and sale by butchers of infected or diseased animals, and these statutes apparently embodied regulations long in vogue.

In regard to the organization of the school at Salerno it would appear that there were four regents; the patron saint was Matthew; the seal bore the inscription "Civitas Hippocratica." The degree conferred was Magister. In time a distinction was made between magister and doctor, the latter designation being given to graduates whose attainments entitled them to teach, somewhat as we distinguish to-day between the common doctor and the professor in a medical school.

In the course of time it became customary to grant special licenses to men who restricted their practice to war wounds, to diseases of the eye or to rupture. Candidates for license had to furnish evidence that they were born in wedlock. Physicians were appointed to serve at court, and there were royal midwives. Physicians were appointed to serve with the troops. They were mounted officers, and their commissions stipulated whether they were to have one or two horses. There are records of claims submitted by these military surgeons to recover for horses which were sick or had died.

P. Giacosa, in his work "Magistri Salernitani nondum editi,"[1] says: "The references which we find scattered through the most ancient chronicles in regard to Salerno, do not speak of famous teachers but of physicians with a reputation for their cures. Medical literature, therefore, necessarily reflected this state of affairs and was essentially technical and practical." Again, referring to certain ancient authors, "* * * they mark the moment when the medical school of Salerno comes forward with publications in which previous material scattered and dispersed throughout various manuscripts is collected, assembled, and systematized for adaptation perhaps to medical instruction. The materials are still the old materials, but undergoing coordination and distribution, and in accord with logical concepts as to use. * * * We now see the masters of Salerno in a position to write for themselves. If we can not pronounce their work absolutely original [how many years must still elapse before anything absolutely original is written in medicine] it is certainly individual and characteristic. What we see in their books is no longer a mosaic of fragments derived from ancient authors, but an elaboration of their materials worked up and arranged in a new form."

We may thus summarize the positive results accomplished by Salerno. It was the first great center for systematic medical study and maintained through at least three centuries a definite and high standard of professional learning. It encouraged the study of medicine by women, disseminated a literature that embodied the highest professional achievements of the time, and recognized ability without regard to race, creed, or sex. Accurate observation of physical phenomena and common sense therapy was emphasized. Sanitation was developed. Careful compounding was enforced. All learning was held in honor. The conscientious, studious practitioner was sharply differentiated from the employer of claptrap remedies, the charlatan, the irresponsible, itinerant vender of nostrums. On the other hand the masters and doctors of Salerno were not too fine to roll up their sleeves and soil their hands in the interests of their patients. They opened abscesses, abstracted blood, made vaginal examinations with the aid of any resilient bit of metal that could be arched over and by its spring hold the labia apart to permit the introduction of guiding finger and instrument. They worked in association rather than singly, having an eye always to the honor of their school and confraternity and of those who had gone before, and they had that true business instinct which in the long run operates for the benefit of patient and physician alike.

[1] Bocca Bros., Turin, 1901.

In a word, Salerno was a pioneer in many fields of endeavor which have not been completely exploited in our own day. We see in the literary work of the four masters and in the practice of cooperation by professors of Salerno in attempting to elucidate a subject without regard to individual fame a foreshadowing of the "team work" which is fast becoming so valuable a feature of hospital work in medical centers like Philadelphia, Chicago, New York, and Boston.

The last ray of luster that fell upon Salerno as its fame declined and its following grew smaller and smaller was shed by the school of Paris, when, in 1749, torn by internal dissentions over the relative status of physicians and surgeons, the dean of the medical faculty wrote to this ancient guide in learning and conduct to obtain an opinion on this delicate and important matter. The reply of Salerno is not extant but we may legitimately assume that the verdict was in full accord with its glorious record of combined wisdom and practicality.[1]

[1] The contributor of this paper disclaims any pretense to original research, having merely translated or quoted passages from the Latin, Italian, French and English works referred to in the text, hoping to attract the attention of some of the readers of the BULLETIN to a subject of great interest.

EDITORIAL.

CONCERT PITCH.

To the real music lover, the confirmed opera goer, what is more appetizing, more delightfully prophetic of the pleasure about to be enjoyed, than the thrumming and scraping of violins, commonly called tuning up? It makes an appropriate accompaniment to the shuffling of feet, the swish of skirts, the rattle of seats being dropped into position by enterprising ushers as the belated portion of the audience with a certain air of harboring reproachful consciences hurries to the allotted places. There will be a pause when all the strings have been tightened and the instruments are in tune, a solemn, delicious moment of silence, followed by the rap of the conductor's baton, and then the pure bliss of perfect harmony.

The tuning up is an absolutely necessary preliminary to proper instrumentation, because instruments can not remain at concert pitch between performances. It is the same with the human machine. The heart strings must relax, the brain must rest. Sleep, diversion, change of scene, are necessary to efficient performance of work, and correspond to the lubricant, without which the most powerfully constructed mechanical converter of energy will go to ruin by attrition of its constituent parts. These are all trite and old sayings and would need no repetition if people, busy about many things, were not prone to forget the less obvious facts. In November the papers contained a startling account of how a civilian threw himself from a window, owing to a nervous breakdown, the result of strenuous voluntary labor for the Government, now embarrassed by multitudinous problems of many kinds. While far too many of our people are still asleep or enjoying the comfortable but unreal security of the proverbial ostrich, a respectable number of Government servants and their coadjutors are working at high pressure, and must inevitably go to pieces unless they can temper zeal with judgment, and appreciate that in this war the race is not to the swift. Had the overwhelming strategic defeat of the Marne been inflicted upon an enemy counting solely on the effect of a sudden coup and incapable of sustained effort, the war would not be in progress still. Sustained effort, and not violent self-damaging, short-lived effort, is what is desired in our partiots to-day. If we put a Derby winner, capable of a mile and a half of strong running, into a seven-furlong race, he will be beaten by any selling plater having a little burst of speed;

but the big race and the big prize are what we are entered for, and there a burst of speed will avail nothing. Just now there is urgent need, it is true, for us to produce men and arms as fast as possible, but they must be good men and good arms in great numbers, and we must not underestimate the distance we have to travel.

For years some of those who have watched the system of training in our fleet have felt that there was a disposition to use hothouse methods in a struggle for prompt, visible results, and the conviction has grown stronger and stronger that it is a grievous mistake for any ship to sacrifice the making of a body of all around man-of-war's men to the glory of winning the trophy in a single target practice. Everyone admits that too often haste makes waste, but it is not for the ambitious young gunnery officer to be held back by such considerations. These are rather for the larger view, the larger powers, and the larger responsibility of those who have the direction of the aims and methods of the naval service.

With this long introduction, we come to the single point in mind. A rather limited number of naval vessels are employed in the hazardous and highly important work of convoying transports. It is arduous duty, requiring that all the faculties of every man on board be at high tension for at least five days on each voyage. If the balance of the voyage, the portion outside the danger zone, could be passed in peace and quiet, at rest, with diversity of scene and occupation, both mental and physical, such an interval would largely supply the opportunity for the necessary relaxation between performances; but such is not the case.

Those who know ship life know that there is no real relaxation at sea, either for the stoker or the lookout, the captain, or the young watch and division officer. Even if all threat of torpedoes and mines could be eliminated, any available time must be given to instruction and drill, more necessary now than ever, with crews composed largely of willing and eager but comparatively inexperienced men. And finally there is the endless labor of upkeep, the fight by ceaseless chipping, scaling, red-leading, and painting against all the factors operating to disintegrate the ship itself. No landlubber has any conception of what huge proportions this task assumes, and officers on long periods of shore duty are likely to forget it like many other things that become hazy to those who occupy the seats of the mighty. In port there is repairing and loading and unloading to be done, and all too quickly the ship is off for another run. It is a fascinating game, but it has its drawbacks. Unless after three or four consecutive trips a given ship can skip a voyage and its complement enjoy the restorative effect of a fortnight ashore, deterioration of service through impairment of the human machine is inevitable, and disaster will be inevitable too. Men grow used to anything in time, and

men also become so jaded as to be indifferent to the most startling menace. A jaded lookout! "Impossible," you exclaim, "when the submarine is lurking near by." Well, familiarity still breeds contempt, and monotony still continues to be the deadly foe of energy and initiative.[1]

The American is a special type, and that particular and undefinable composite creature, the American sailor, is a special subdivision of the species. After two or three runs he is apt to assume toward certain dangers a mental attitude expressed somewhat as follows: "If they are going to get us, they'll get us," and having survived several round trips he begins to consider creature comforts. *The crews of convoys and patrols should be neither physically jaded nor clothed with mental apathy.*[2] Medical officers must bear this in mind and do what they can, by judicious representations to proper authority, to maintain the hygienic balance of the psychic as well as of the physical elements in the men of the service, since the equilibrium of the former depends on the latter.

We have been invited by our allies in a candid and generous manner to profit by the mistakes they committed in the earlier periods of the war, and we would certainly be foolishly blind not to profit as well by instances of their sound judgment and wide range of vision. Unfortunately it is often difficult to determine the exact importance to be ascribed to a given factor in the conduct of affairs not yet concluded, whose success has not been signaled by a definite, manifest, conclusive victory. We believe that it is from motives of shrewd policy, with the purpose of developing the maximum output of the best effort in the moment of acute need, and not from any sentimental regard for feelings or for individual happiness (save as reasonable contentment makes for efficiency), that the British Admiralty, through all the long period of vigilant guard maintained in the Channel and North Sea, has consistently sent groups of men on leave and periodically relieved ships from guard in the zone of active duty.

We are engaged in an attempt to bring the personnel of our battleships to the highest possible state of efficiency. To this end, drills are long and frequent, and many features of war conditions

[1] Speaking of the value of a careful lookout as a protection against the submarine, the First Lord of the Admiralty, Sir Eric Geddes, said that if a submarine is sighted by the lookout on a vessel—whether the vessel is armed or not makes no difference—it is seven to three on the ship in favor of its getting away. Out of every ten attacks, when the submarine is sighted by the ship, seven of them fail; but of every ten attacks when the submarine is not sighted eight ships go down.—Scientific American, Dec. 29, 1917.

[2] Medical Inspector C. N. Fiske, United States Navy, in a footnote to his article in the last BULLETIN, says: "The tension noted formerly in danger zones has become relaxed to such a degree that resort to alarms has been suggested to keep the men alert."

are being introduced, perhaps somewhat artificially, into the fleet. In the struggle for efficiency two things must be continually borne in mind: First, men enlisted for a term of years have less at stake than officers who have entered the Navy for life, and they possess infinitely fewer resources within themselves to enable them to endure long periods of monotonous isolation; second, drills and imaginary war conditions, if imposed and prolonged ad nauseam, produce general fag and staleness. Nausea is not a state from which men leap strong into action. Zest and freshness are the spring that sets the most valuable activities in motion. Let us not break the spring, nor, by long-continued ill-timed pressure, destroy its resiliency.

THE OIL IMMERSION VERSUS THE LOW-POWER OBJECTIVE.

Dr. Meigs, of Philadelphia, famous in his day throughout the country for his success in curing the sick, used to say that if a physician had to be restricted to either general or local treatment he should unhesitatingly choose the former. It may also be accepted as true that in most cases a general survey of all the symptoms and attendant circumstances of the sick man will give a clearer picture of his condition than the minute and exhaustive study of any single factor in the case. The ideal examination, of course, comprehends anamnesis, study of symptoms, physical diagnosis, and the application of the precise methods of the modern laboratory to every element of the materies morbi. Such a thorough exploration is not always possible, however, and there is a tendency to-day, especially on the part of our younger brethren, to lean unduly on extrinsic aids to diagnosis.

Any disposition to discredit the value of the reports of pathologists, bacteriologists, or other specialists would stamp a man as a fool, but a warning suggestion is not out of place. The naval surgeon is frequently beyond the reach of expert assistance. A laboratory is not always within call, and there are no coat-tail pockets in his working uniform to accommodate stethoscope, sphygmomanometer, and other mechanical aids. Situations constantly arise where the medical officer is confronted with a patient and must make a diagnosis without microscope, books, or specialists to assist him. He has available for the task his medical knowledge, his five senses, and, it is to be hoped, that sixth sense which functions without visible organ.

The common idea of the laity is that, given a certain set of symptoms, a diagnosis follows as a matter of course. On board ship many of our patients regard the diagnosis and treatment of disease as analogous to the work of a signal quartermaster. When the man

on the bridge is told to signal to another ship he has only to whip over the pages of the signal book and secure from the index the conventional letter, word, or number required for each unit of the message. When a signal is to be deciphered the reverse process is to be employed. At the mention of a pain in the back, a numbness in the toe, a headache, there should, according to the popular notion, flash into the doctor's mind, supposed to correspond to the index of the signal book, a prescription appropriate to the symptom named.

"Doc, have you anything good for a headache?" is a question that the general practitioner probably hears on an average of once or twice a week throughout his professional life, because the public does not realize that the doctor's mind is not an automatic device like an adding machine. The doctor is essentially a judge, and the symptoms and signs of disease are the witnesses. Many of them are humdrum, uninteresting, witnesses whose answers can be anticipated—self-important, voluble witnesses who like to be summoned in every case and enjoy making themselves conspicuous. How constantly headache, fever, constipation, coated tongue, malaise, and anorrhexia file past the tribunal. Other witnesses, e. g., the solitary crepitant râle, the occasional cast, the faint chemical trace of albumin, the unilateral change whose significance is purely relative, the barely perceptible alteration of temper or disposition are elusive, sly, uncommunicative, eager to slink by unobserved and have their whispered responses drowned in the noise of trivial reports. In the total volume of evidence much is negligible, some has a corroborative value, and but a small portion may point to the offending member and tilt the scales which the discriminating judge balances so carefully. The good physician is the good diagnostician, and the good diagnostician is he who best knows how to discard the mass of irrelevant matter and quickly seize the telltale detail. The faculty to do so is derived in the main from a close study and comparison of countless clinical cases.

Considering our predecessors in this way, we must recognize them as our superiors in diagnosis. They could interpret the odor of the typhoid fever patient, the facies of cardiac and peritonitis cases, the peculiar aspect of the victim of tonsillar abscess. They could feel the alterations in the pulse wave of a typhoid patient. The pulse of aortic regurgitation made a stethoscope unnecessary. The physician of to-day usually recognizes little in the pulse save its rate and volume, and is lost without those accurate mechanical devices whose multiplication tends to hinder the development of diagnostic acumen and the acquisition of the priceless ability to weigh each fact and assign to it its exact value.

Habitual users of the high-power objective are numerous among specialists, and how the general practitioner writhes in exasperation.

over some of their verdicts! Fifteen years ago a midshipman came to the Bureau of Medicine and Surgery to have an aural defect waived preliminary to graduation. He was armed with a statement from an able and honorable ear specialist that there was nothing in the disability to debar the bearer from years of useful service. A medical officer, concerned in the decision, called on this specialist, whom he happened to know personally, and asked him, with justifiable indignation, to explain his affidavit. The specialist stood by his guns, maintaining that if the patient would call at his office from time to time for a little special treatment his ear would be good for years to come.

"And how will he call when serving in Haiti, on the upper Yangste, or in the Celebes?" asked the Navy doctor, substituting a two-thirds for a one-eighth inch objective.

An officer with a bad heart, variously diagnosed as myocardial degeneration, auricular fibrillation, etc., whose symptoms and signs were dyspnœa on exertion, attacks of vertigo, a soft, irregular, nearly imperceptible radial pulse, an inaudible, impalpable apex beat, a diastolic pressure of 90, a systolic pressure of 100 to 105, who was retired from active duty, had no trouble in getting bona fide specialists to assure him that he was perfectly fit for duty as executive officer, *provided he did not overexert himself or undergo any mental strain, but led a quiet, care-free life*, which was comparable to telling the foreman of some industrial plant to go to work, but to wear an eye shade, sit in a rocking-chair, and talk in a whisper.

It is more startling still to behold a civilian urologist taking up the cudgels in defense of victims of venereal disease and certifying to an innocent origin, because with the lapse of time and with changes in the moral and social status of the patient it often becomes so highly desirable to establish a nonvenereal origin. The absence of a scar on the penis is accepted as ample evidence of nonsexual infection in the private patient, as though extragenital sores were unheard of. That a man should pass through the hands of a dozen medical officers, receiving treatment for 3 or 4 years, eventually be discharged from the service for some gross lesion of the nervous system, and yet wait 10 years before claiming to have contracted the disease in any but the old-fashioned way, would certainly strike 12 ordinary jurymen as highly improbable, even if they had surveyed the corpus delicti through a magnifying glass and found nothing. Nevertheless such cases, such histories are constantly presented to the Bureau for adjudication.

These are exaggerated cases and serve as a reductio ad absurdum of the one-sided views of certain professional men. They show how far some specialists can go in defending what they regard as the patient's interests (sic) against unbending Government requirements. There

are many instances of less conspicuous disability in which room for doubt exists, though there is a preponderance of probability that, under service conditions, the disability will either become serious or assume such importance in the mind of the sufferer as to preclude his doing useful work for the Government and be made the excuse for leaving the service before he has given a quid pro quo for the expense involved in his training. These service conditions are outside the field observed by the specialist with the high power objective, which is natural enough, but there is no excuse for his failure to attempt to estimate the force of these considerations, for his calm neglect of that side of the case.

Eminent in the domain of physiology, a man urges butter for an emergency ration, because butter is such an admirable form in which to supply some of the needed fat in the normal diet of human beings under normal conditions of living. A butter ration stored for three years, prior to use, in a paymaster's storeroom, located perhaps no great distance from the ship's boilers, might not be any better than a digestible oil; if kept under different conditions it might, on the day of shipwreck, approximate to tallow. Examples might be multiplied of the excellence, from a technical point of view, of the advice constantly proffered and the methods suggested, which are impossible of application to the abnormal life of that abnormal creature—the sailor. (A learned Englishman once reproved a young lady for speaking of a "common sailor," and informed her that there was no such thing as a common sailor, for any and every sailor was a most uncommon and extraordinary animal!)

The ophthalmologists crave an opportunity to instruct the sailor about the care of his eyes; students of sociology would like to form an antivenery organization; the psychiatrist urges the claims for exemption of the feeble-minded; the anthropologist wants to measure the boys, and so on ad infinitum.

Because widespread epidemics play havoc with the numerical strength of fighting forces, we are busy now detecting meningitis carriers and perfecting methods of detention and isolation for recruits, with antityphoid treatment and vaccination against smallpox sandwiched in between cultures, swabbing, and disinfections. It is not an easy matter to get the recruit safely through these various steps in three weeks, and long before the expiration of this period the line officer is clamoring to have his pupil begin the long and laborious training necessary to make him handy with a rifle, able to pull an oar, familiar with the drill manual, acquainted with the rudiments of wigwagging, and a host of other things that must be learned before he is fit to embark and begin his novitiate at sea. Medical work of this character has immediate practical value.

For the present, however, there must be a limit to those many and varied scientific investigations, of less imperative necessity for which the enlisted man affords such a convenient, docile, and inexpensive subject. It would be interesting to give bismuth meals to 20,000 lads to determine the percentage of ulcers in stomachs and bowels of seemingly healthy males. It would be interesting to test them in the laboratory for varying degrees of idiosyncrasy to vegetable and animal protein. Electro-cardiographic tracings and X-ray examinations of chests would yield valuable data and make interesting footnotes and statistical tables for one more highly scientific book. Eyes and ears could be investigated with profit and there are kidneys—two to a man—and hands and feet, and the recruit's intellectual faculties might bear scrutiny. But just now our country happens to be at war and the country's situation should be surveyed under such magnification as will furnish the largest possible field of view and the maximum of definition.

In attempting to select our material for the prosecution of the war, there is danger of becoming hypercritical and overfastidious. There will inevitably be large loss of life in the field at the hands of the enemy. Inevitably, too, some lives will be sacrificed outside of the danger zone, because of weaknesses not discovered during the training period, but the campaign must be prosecuted as the paramount thing, and the tabulation of interesting medical facts and the conduct of scientific investigations must for the moment wait on the settlement of those larger issues which are threatening to-day the life of peoples and races. Just now the ability to handle Navy beans had better be determined by the practical test of the mess table, and the vicissitudes of life on destroyers and submarines in the British Channel and the German Ocean will amply demonstrate to what extent our men have the *stomach* for a fight.

SUGGESTED DEVICES.

A SUBSTITUTE FOR THE SAILOR'S HAMMOCK.

By C. P. KINDLEBERGER, Medical Director, United States Navy.

Practically all experienced medical officers, I think, are a unit in concluding that the present hammock for enlisted men is a relic of the past; that it has been retained for want of a suitable substitute, and should be replaced, if practicable, by some other form of sanitary, comfortable cot or bunk.

The ideal sleeping accommodations on board ship would be folding or stationary, single or double-banked bunks, with spring bottoms, similar to those installed on the latest type of destroyers, in sick bays, chief petty officers' quarters, and on board transports. This, however, is impracticable at present, owing to the large crews of modern men-of-war and the lack of sufficient space.

I firmly believe that a certain number of men can not sleep comfortably in the Navy hammock on account of the exaggerated curve, which causes morning stiffness of the back, due to overstretching of the lumbar muscles and ligaments for a number of hours. These men and others, who for various reasons do not like to swing in their regular billets, will be found sleeping on deck, on top of chests, and in out-of-the-way corners of the ship—a most insanitary and unsatisfactory way of sleeping. Others attempt to flatten their hammocks and reduce the curve by using spreaders.

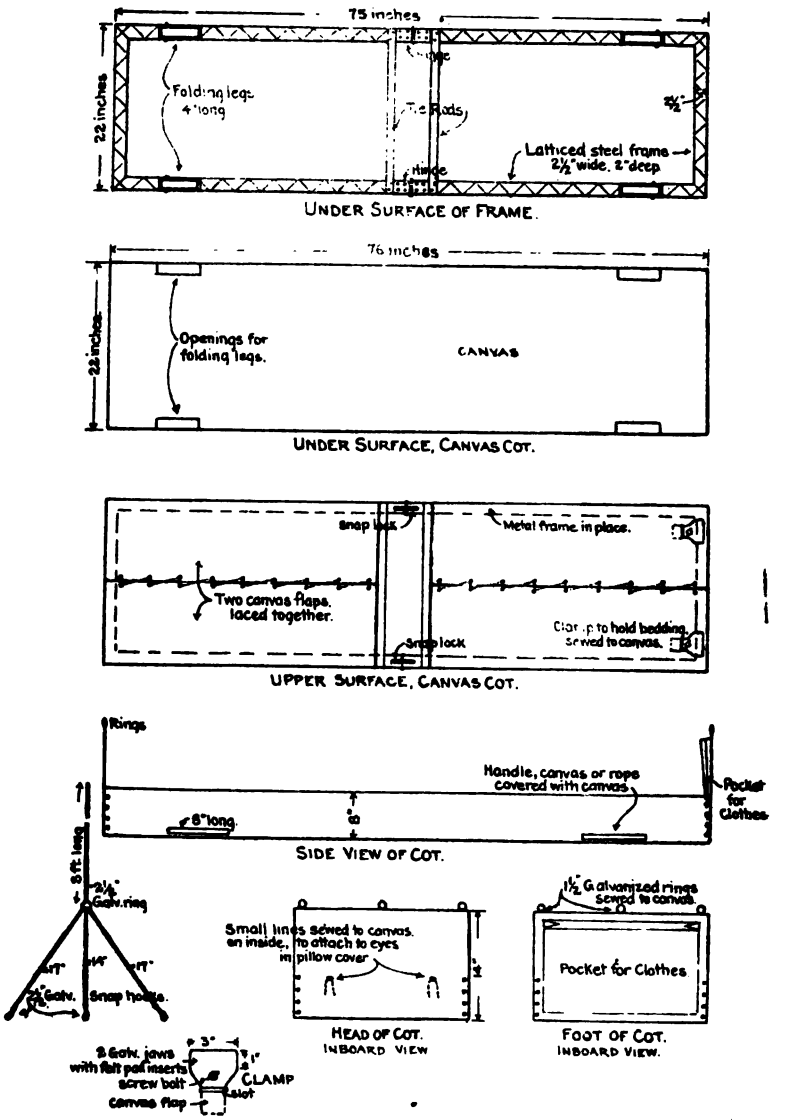
The blanket furnished for night covering is usually half off the sleeper, leaving his feet and legs exposed to the drafts from near-by blowers, hatches, or ports; undoubtedly an important predisposing if not the exciting cause of most of the cases of tonsillitis, bronchitis, coryza, etc., which are so prevalent on board ship during the winter months. In the summer time the blanket is entirely too hot, and can not be used as a covering.

The swinging cot I have designed for use on board ship, the plans and specifications of which are shown in the illustration, is practically a combination of the old hospital cot and Army litter.

This cot has, I believe, the following advantages:

(*a*) It furnishes a comfortable, flat, swinging bed, which should move gently with the motion of the ship and remain practically level at all times, thereby reducing the incidence of seasickness among susceptible members of the crew.

(*b*) These cots can be swung on two or three levels, if necessary, giving better air space per man and allowing a more orderly arrangement than is possible at the present time; also permitting a gangway to be left open fore and aft on each of the sleeping decks.



Cot substitute for hammock.

(*c*) The pillow is just thick enough to elevate the head slightly above the general level of the body, and the sheet is an addition, both for use in cold weather and in the summer time, when a light covering is necessary, to protect those sleeping on the open decks from the chill and dampness of the sea air.

(*d*) The clamps designed for the foot of the cot will hold the bedding in place at all times and prevent chilling of the feet and body.

(*e*) The pocket for clothes, located on the inner side of the foot of the cot, should lead to the readoption of pajamas or some suitable form of night clothing for the enlisted men, thereby doing away with the present insanitary and objectionable practice of sleeping in the underclothes.

(*f*) The canvas part of the cot can be quickly removed from the frame for scrubbing. The suspension ropes, with their snap hooks, are easily detached from the six rings sewed to the canvas ends. The hinged metal frame will allow the cot to be hung over the rail or awning ridge rope, and permit adequate airing and sunning of the bedding.

(*g*) The canvas sides of the cot will keep the mattress and bedding in place, and protect the sleeper from drafts, and the fastenings on the pillow cover will keep the pillow in place.

(*h*) When folded and lashed these cots will stow neatly in a row, like a shelf full of books. It is realized, however, that these cots will require more stowage space than the present hammocks.

(*i*) When the 4-inch folding feet are opened, one can sleep on the open decks with comfort, and be assured that the bottom of the cot and bedding will remain dry unless a heavy sea is shipped.

(*j*) When the feet of the cot are folded, four bearers can carry a sick or injured man to the sick bay by means of the rope handles on the sides. If the sick bay is on another deck, the patient can be lashed in and slid up or down the nearest gangway ladder. By means of a sling hooked in the handles, a patient can be lashed in this cot and lowered over the side to a waiting boat for transportation to a hospital ship or a hospital on shore.

(*k*) The metal frames for these cots should be part of the equipment of each ship or station. Upon transferring a man from one ship or station to another the pillow, mattress, and bedding could be rolled in the canvas portion of the cot and lashed to the clothes bag.

AUTOMATIC DRINKING CUP STERILIZER.

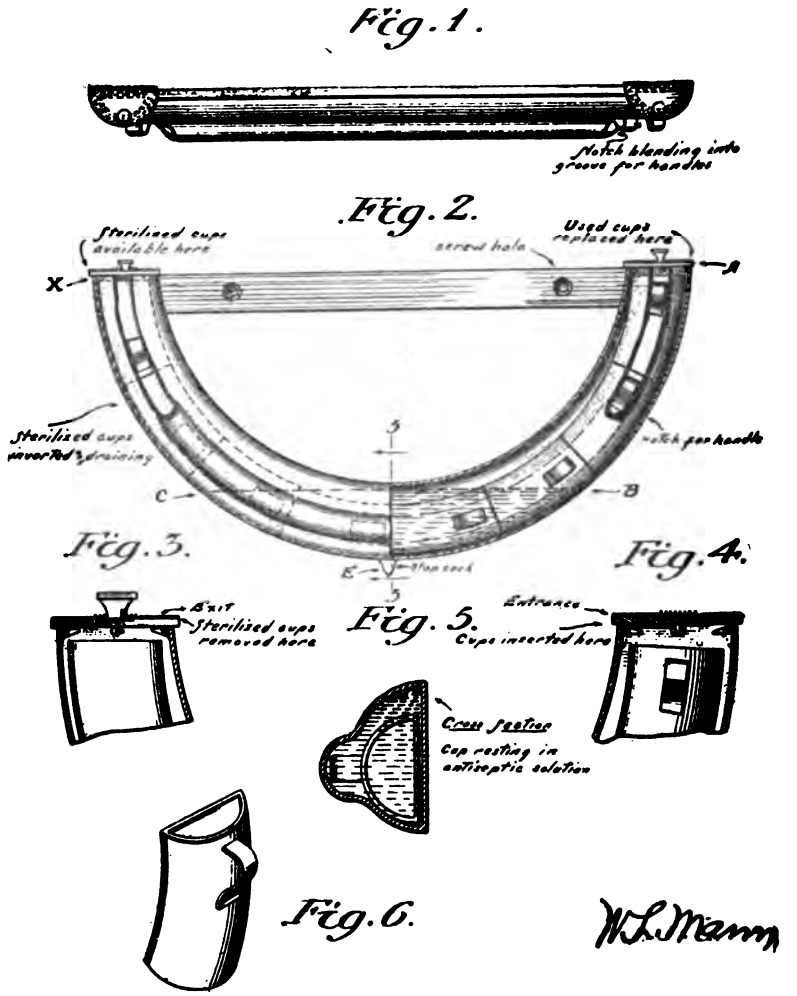
By W. L. MANN, Passed Assistant Surgeon, United States Navy.

This consists of a semicircular tube containing a chain of cups. A cup enters upright, is pushed through the solution and emerges in an inverted position. The entrance *A* has a one-way catch, which permits insertion but not extraction of a used cup.

The shape of the cup in relation to the tube permits insertion of the cup in only an upright position, rendering it fool-proof.

Each time a used cup is inserted it causes a sterilized cup to become available at exit end, a one-way catch permitting extraction and preventing insertion.

The cup enters upright, goes through the antiseptic solution and emerges in an inverted position to permit drainage.



Automatic Drinking Cup Sterilizer

A–B, entering section; *B–C*, sterilizing section; *C–X*, draining section; *E* is a stopcock to drain off the antiseptic fluid previous to renewal.

Solution used: Tabloid of chlorinated lime dissolved in a cup of water.

A working model made some time ago gives fair indication of success but the type of metal to be used for the sterilizer and the best antiseptic solution is still *sub judice*, corrosion having to be considered.

A FORM FOR DAILY SANITARY REPORTS.

By R. W. PLUMMER, Medical Inspector, United States Navy.

MEDICAL DEPARTMENT,
UNITED STATES MARINE BARRACKS,
Navy Yard, Philadelphia, Pa., _____, *191*_.

From: Post surgeon.
To: Commanding officer.
Subject: Sanitary report.

BARRACKS No. 1.

Ventilating_____ **Heating**_____ **Lighting**_____
Second floor, Back room, north____**No. of men**_____ **Cubic feet**_____
Back room, south____**No. of men**_____ **Cubic feet**_____
North dormitory_____No. of men_____ Cubic feet_____
South dormitory_____No. of men_____ Cubic feet_____
Fourth floor room_____**No. of men**_____ **Cubic feet**_____
Brig_____ **Lavatories**_____ **Baths**_____
Remarks_____

BARRACKS No. 2.

Mess hall_____ Gallery_____ Butcher shop_____ Cold storage_____
Disposal of garbage_____
Second floor, North central room__**No. of men**_____ **Cubic feet**_____
South central room__**No. of men**_____ **Cubic feet**_____
South end room_____No. of men_____ Cubic feet_____
North end room_____No. of men_____ Cubic feet_____
Third floor, North central room____**No. of men**_____ **Cubic feet**_____
South central room____No. of men_____ Cubic feet_____
North end room_____No. of men_____ Cubic feet_____
South end room_____No. of men_____ Cubic feet_____
Lavatories_____ **Baths**_____ **Flushing**_____
Lighting_____ **Heating**_____ **Ventilation**_____
Remarks_____

BARRACKS No. 3.

Mess hall_____ Galley_____ Bakeshop_____ Coal storage_____
Disposal of garbage_____
First floor, West end room_____**No. of men**_____ **Cubic feet**_____
Second floor, West end room_____**No. of men**_____ **Cubic feet**_____
West central room___No. of men_____ Cubic feet_____
East central room___No. of men_____ Cubic feet_____
Third floor, East central room____**No. of men**_____ **Cubic feet**_____
West central room___No. of men_____ Cubic feet_____
West end room_____No. of men_____ Cubic feet_____
Fourth floor room_____**No. of men**_____ **Cubic feet**_____
Heating_____ **Lighting**_____ **Ventilation**_____
Lavatories_____ **Flushing**_____ **Baths**_____
Remarks_____

POST EXCHANGE.

General condition_____

OUTBUILDINGS AND GROUNDS.

MEDICAL DEPARTMENT.

Total number of men on sick list, all causes---------- ----------
Total number of contagious diseases---------- ----------
Total number of venereal diseases on sick list---------- ----------
Total number of venereal diseases under treatment---------- ----------

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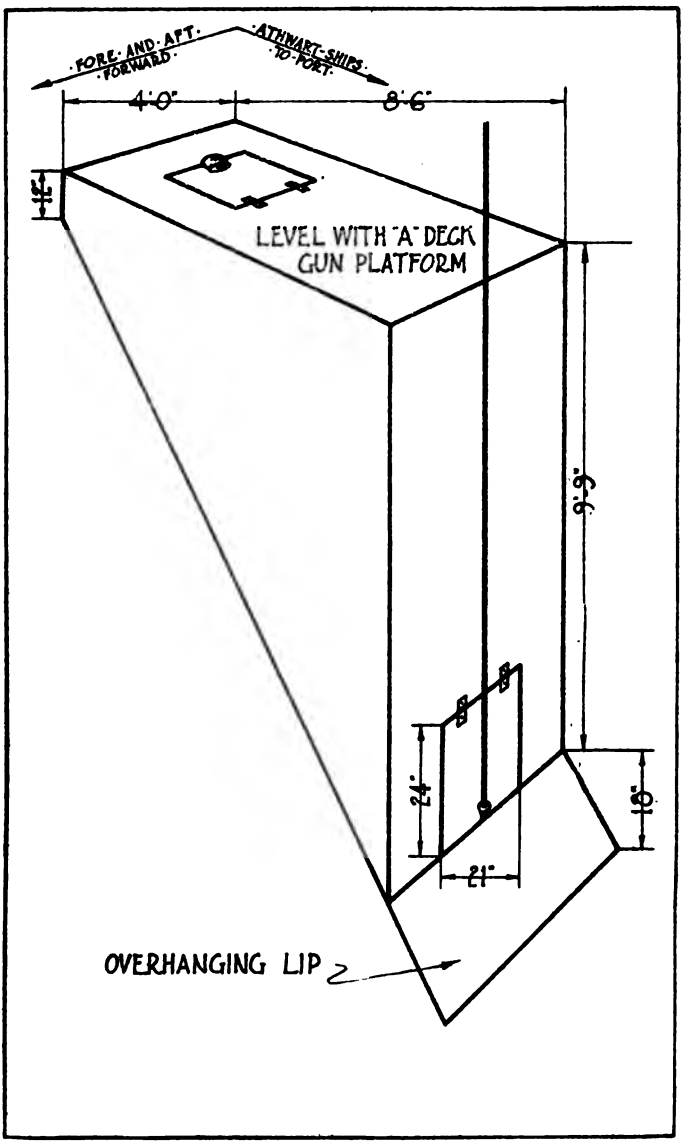
United States Navy.

A GARBAGE BIN FOR USE ON NAVAL TRANSPORTS.



Dimensions and type of garbage bin proposed for naval transports.

257

Right leg.

CLINICAL NOTES.

THE HANDLING OF A FRACTURE CASE AT SEA.

By C. C. Kress, Passed Assistant Surgeon, United States Navy.

At 4 p. m., September 10, 1917, when three days out on a cruise, Ensign A. I. M., United States Navy, fell from the maintop to the superstructure deck, 30 feet below, striking the clear deck upon his feet, bolt upright. Both legs were fractured a little above the ankles, but there was no shock or unconsciousness at the time. The left leg showed little deformity, but the right was flexed backward at the site of the fracture of the two bones, giving a flail joint.

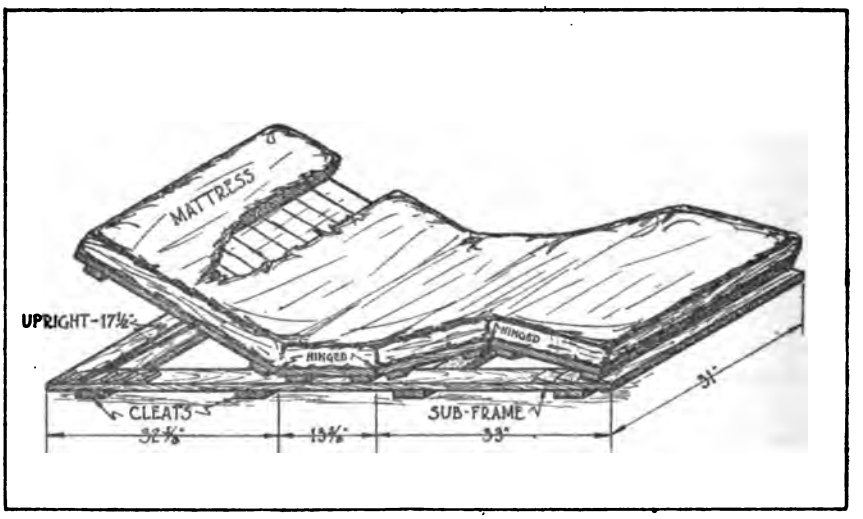
On careful examination under ether anaesthesia, the right leg showed fracture of both bones in the lower third, the fibula being compounded on the lateral surface of the leg about 4 inches above the malleolus, the guilty member being the lower fragment (upper end), which overrode the upper fragment and was lying lateral and anterior to it. The wound thus caused was so patent that no enlargement was necessary. Iodine was applied and a cigarette drain carried to the bottom of the wound, which allowed free drainage.

The overriding of the fragments of the fibula and the oblique nature of the tibial fracture made it impossible to get a good approximation in this leg, in spite of careful traction and manipulation. In the left leg, however, reduction to good alignment was easy: probably the fibula had remained intact. The tibia was fractured in the lower third. The tumefraction about the ankles and the increased width of the ankles indicated considerable damage—perhaps rupture of the tibio-fibular ligaments—or involvement of the joint through extension of the fracture of the tibia, usually spiral.

The limbs were placed in fracture boxes suspended by gallows above the level of the fracture bed, giving slight extension, care being taken to have the feet at right angles to the leg, and avoiding rotation of the leg—the most useful position in case of bad result. The fracture bed had been constructed on board at my direction for a case of peritonitis and used to obtain the Fowler position. It was built to fit over a sick-bay bunk frame, and had an adjustable head and foot piece. When covered with a mattress it made a most indispensable apparatus, equally good in peritonitis, large fracture cases, and extensive burns. A sketch of the construction is shown.

The patient had no shock, but vomited a little. At 8 p. m. tetanus antitoxin, 1,500 units, was administered. Temperature, 100.2 F.; pulse, 90; respiration, 18. Catheterization was required soon after midnight, and 500 c. c. normal urine, specific gravity 1,030, were drawn off.

At 9 p. m. September 11, 1917, it became necessary to remove the extension, as the ankles had become so ecchymosed, swollen, and edematous with formation of vesicles that the pressure necessary to secure any extension could no longer be endured. The drain in the compound wound was renewed and the wound re-dressed. Temperature, 101.5 F.; pulse, 104; respiration, 24. Evidence of slight shock



Fracture bed.

and some reaction to the antitoxin. On September 12 the urine, which had been scanty and of high specific gravity, was suppressed. This is a symptom of a delayed internal injury. It was relieved by hot packs. No evidence of wound infection. No extension was employed now, except that obtained by the pull of the body's weight on the leg, elevated on the fracture bed, and fixed in the fracture box, which was anchored to the bed.

On September 13 the temperature became normal at noon, but at 9 p. m. rose to 101.4, pulse 95, respiration 21. There was no infection of the wound nor need for further drainage. A new difficulty now appeared—a problem new in our service and one which will complicate all our methods of handling severely injured men, namely, the preparation for a possible hasty evacuation at "abandon ship." The ship was approaching the danger zone, and it became necessary to take the patient up from the sick bay to the berth deck and have him ready for quick evacuation from the admiral's cabin on the gun

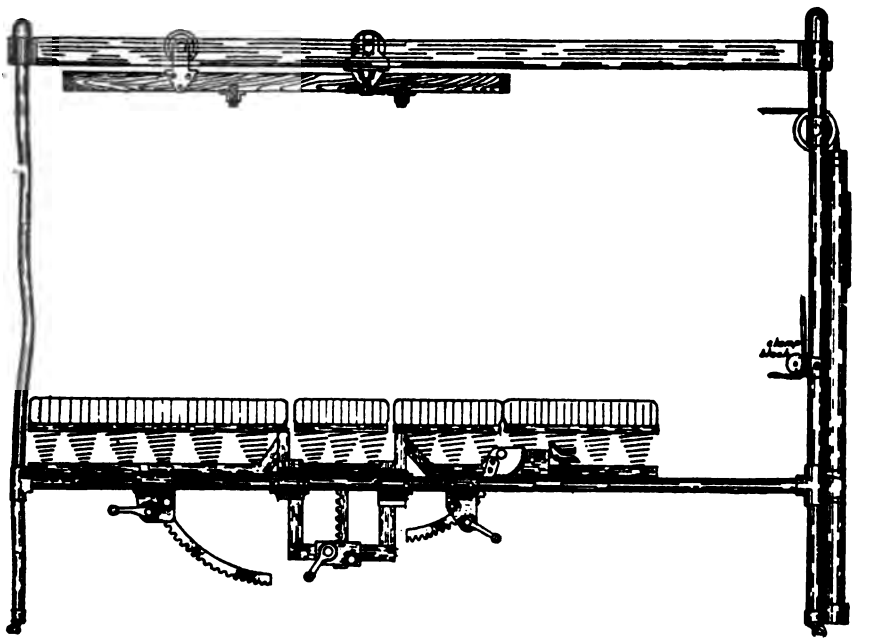
Left leg: Fracture of both bones.

258-1

258-2 Lateral view of left leg.

deck. The fracture bed, mentioned previously, was made into a four-poster bed by the addition of four legs and a suspension apparatus rigged from ring bolts secured to the eyebeams above the bed. A set of two views of this apparatus (Figs. 1 and 2) shows the fracture bed clearly, and the three main lines of suspension running from the chest below the arms, the central portion of the body, and the legs.

By a system of blocks and ballast bags to neutralize the weight of the body, one nurse could lift the patient like raising a window, and have him in a Stokes stretcher in a moment, ready for "abandon ship" or for any extensive handling, cleaning, or dressing without

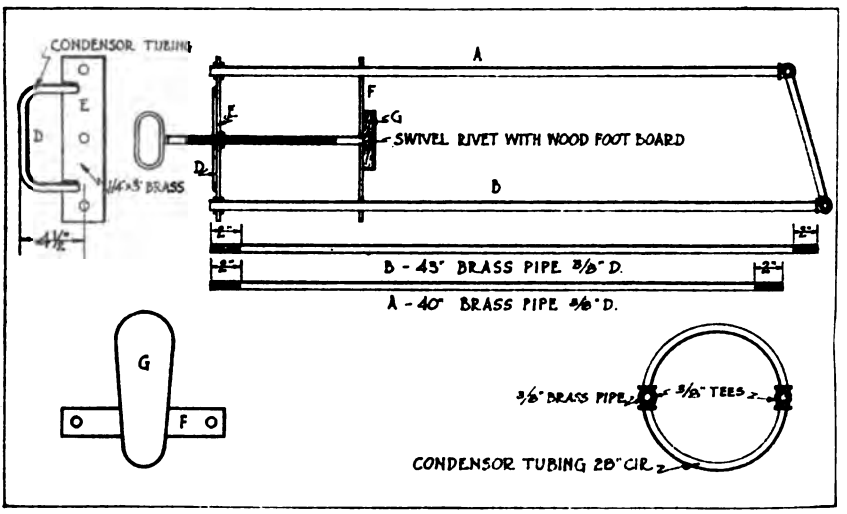


Fracture bed: Side view.

pain or disturbance to the fractures. By means of this apparatus extension as well as suspension was available for the legs. Figure 1 shows the legs put up in Thomas splints constructed aboard ship. Suspension was secured to these splints at the foot ends and at the front of the hip ring, extension being maintained by the splints, which also gave counterextension. These splints were not applied until the ankles had improved sufficiently to warrant receiving the pressure required for securing extension—two weeks after the accident (September 24).

A myocarditis developed on September 14, together with a severe bowel disturbance. The latter was soon under control; the former condition lasted until the 17th. There was a rise in the temperature every evening, the inguinal glands becoming slightly enlarged, but

the patient complained of practically no pain in the legs after the effects of the contusion began to disappear and had little pain, though very rough weather added much to his discomfort and to the difficulties of treatment during the last 10 days of his stay on board. On September 30, after 20 days' treatment aboard, he was transferred to the naval hospital in Washington. Examination of the injury just before his transfer showed the ankles still swollen but the skin all healed; all wounds and vesicles had healed; very slight induration at the site of the fractures despite the lack of extension and the other difficulties of the treatment. The left leg was in very good alignment. The right showed slight shortening due to oblique fragments



Extension device, drawn to scale.

of the tibia and to displacement of the fragments of the fibula, which made it impossible to set the fractures properly. There was ground for believing that the fractures would give a good result, but that there would be some stiffness of the left ankle, and that the right would be almost functionless.

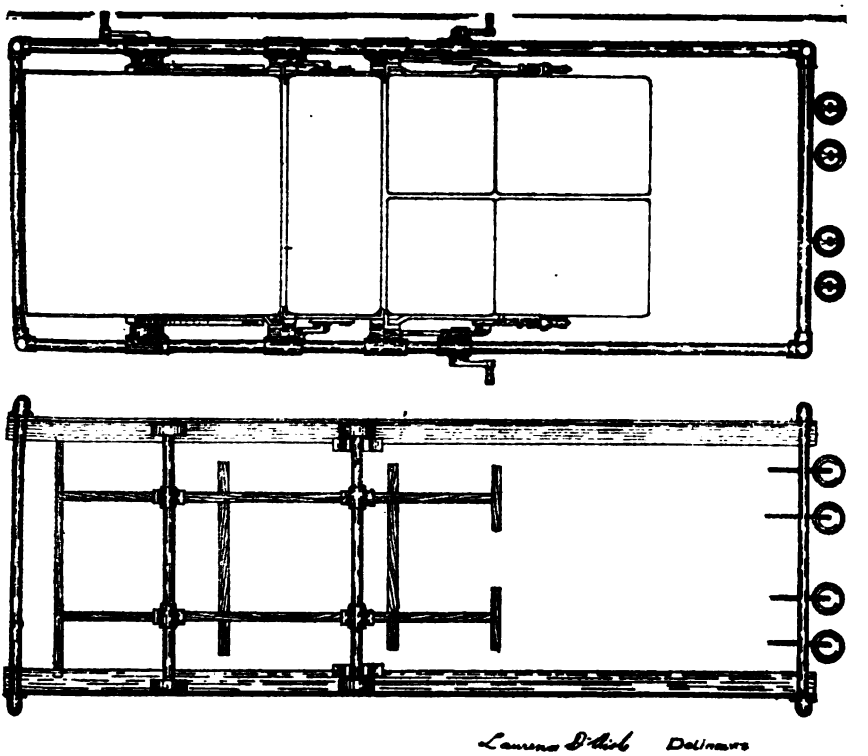
Prints from the roentgenograms made at the United States Naval Hospital, Washington, D. C., taken eight weeks after the accident, show the spiral fractures extending into the ankle joints with the wedging apart of the fragments at the lower extremity of the tibia. The line of the joint in the right leg shows the extent of the damage to the ankle joint. The left fibula is not fractured. The left ankle shows a fairly clear line as though the function would be good. The report from the hospital on this case on November 7 states that the splints have been removed since October 22, the patient being up in wheel chair, and taking automobile rides. The patient states that

Fracture bed arranged for extension, counterextension, etc.

Fracture bed, showing supports to trunk.

there is no pain in the legs and that he can move both ankles fairly well, and notices improvement daily.

Taking care of this case, under the conditions noted above, has originated the suspension apparatus whose design is here shown. The material is obtainable aboard ship, and the device can be constructed by a ship's mechanics. It can be taken down and stored in the medical storeroom. The rollers are eliminated for ship construction and the apparatus is screwed to the deck instead. The overhead trolley is



Fracture bed: Seen from above.

suspended from live axles which operate through wheels running on the side frame of the top of the apparatus, and can be set at any point by means of a set screw and block working on the axle at the foot end. The trolley can be manipulated not only up and down but also across the bed, there being 6 inches free way to each side of the trolley. . There are four lines for suspension with their separate sets of weights inclosed and running in oiled tubes thus allowing for any form of suspension and extension when a slight addition is made to allow for Buck's extension, which is easily applied.

This apparatus combines the properties of the fracture bed with the idea incorporated in the Dodds-Parker suspension. A bedpan

can be used without lifting the patient. Either leg, or both, can be raised or lowered, a ratchet and cog allowing the leg to be lowered at the knee, so that the sitting-up position may be obtained, or a Fowler's position, or an inclined plane for the knee. The advantages of a standard apparatus of this sort, manufactured in numbers for the hospitals in Europe, can readily be appreciated.

A CASE OF DEATH FOLLOWING INJECTION OF SALVARSAN.

By R. A. BACHMANN, Medical Inspector, United States Navy.

On August 28, 1917, C. B. G., seaman, second class, United States Navy, was admitted to the naval hospital, Philadelphia, Pa., suffering with gonorrhea. Later a sore developed on the penis, which, after seven weeks' treatment, showed very little improvement. General glandular enlargement became evident at this time, and, as the patient was a general court-martial prisoner in confinement, it was decided to hasten his recovery by the injection of salvarsan.

On Friday, October 26, 1917, he was given salvarsan, 0.6 grams (European), obtained from the Farbewerke-Hoeschst Co. There was nothing unusual in the appearance of this ampoule, nor was anything unusual noticed in solvency or reaction of its contents. There was no mishap in its administration. It was given intravenously. Six other cases who received similar doses of the same lot of salvarsan at the same time had no reaction. The injection was 200 mil. The water used was doubly distilled to prevent protein reaction. The dose was completely neutralized. The patient was examined prior to administration. His heart, lungs, and urine were negative. Six hours after the injection he vomited. The next day, October 27, he vomited once, and again once the following day, October 28. The third day after injection, October 29, he complained of ringing in the ears, pains in the back and a general feeling of malaise. His urine was examined again and found normal, as was the temperature, pulse and respiration. He received no medication save a laxative. On the fourth day, October 30, he felt better. Then, suddenly, at 4 p. m. he developed a general convulsion, which was followed by others from 15 to 30 minutes apart. In all he had 18 convulsions, and consciousness was never regained from the first. He died at 5 a. m. October 31. No paralysis was noted. During these seizures his temperature varied from 100 to 103, the pulse from 110 to 150, the respiration from 20 to 30, and the urine was markedly albuminous, containing a heavy cloud. Many granular casts were present. The autopsy revealed an acute nephritis and adhesions between the dura mater, the arachnoid, and the pia mater.

This case was probably one of arsenical poisoning, which resulted in nephritic lesions, which in turn were the cause of the convulsions. A history of scarlet fever was obtained from relatives. No skin reaction was present nor was anything noticed that indicated an increase of the syphilitic symptoms such as would point to the conclusion that the case was one of the class of reactions following injection of salvarsan, mercury, etc., known as the Herxheimer reaction.

Furthermore, the death occurred too late to be so classified unless under this title are to be grouped all fatalities following antisyphilitic injections regardless of their time of occurrence or length of time intervening between injection and death. But, as Milian points out in the Bulletin de Dermatologie et de Syphilographie of May, 1912, in commenting upon the deaths from "606" reported by Leredde: "In my opinion cases which do not show a reaction within 36 hours or which do not show any reaction in the skin lesions, mucous patches, or chancres are not properly to be considered under the head of Herxheimer reactions. On the other hand, it is more proper to classify them under the head of arsenical poisoning."

Weichselbaum, in his monograph "Uber die Pathogenese der *Salvarsan* Todesfaelle," considers such cases as directly due to arsenical poisoning and urges a special care in the examination of the kidneys prior to injection. He has shown in the analyses of numerous cases collected by him that the kidneys were nearly always directly involved. Some typical cases which he cites are that of Gauches, who injected a patient on the 17th of August with 0.6 grams of salvarsan. On the 21st vomiting occurred with general malaise, followed later by convulsions and coma. On the 22d the patient died.

Gaucher: Case 1: Bull. de l'Acad. Med. vol. 6, February, 1912. Twenty-four-year-old patient received three injections of 0.3 gram of salvarsan, during a period of 13 days. After each injection he experienced vomiting and fever. Six days after the last injection he had headache with convulsions. The latter recurred repeatedly. In seven days after the last injection he died. Case 2: Patient was injected on the 17th of August, with 0.6 gram of salvarsan. On the 21st vomiting occurred with general malaise, followed later by convulsions and coma. On the 22d the patient died.

Yahoube: Patient 25 years of age, female. Syphilitic infection of six years' standing present. Received December 17 one injection of 0.4 gram of salvarsan, followed by fever, malaise and vomiting. At midnight of the same day she lost consciousness. On the 21st of December deep coma supervened. On the 22d cyanosis occurred and death.

Wolbarst (Nw York Med. Jour., July, 1917): Patient 38 years of age with diagnosis of incipient tabes. Physical condition poor. Five-tenths gram of salvarsan were injected, followed by death 12 days later. Autopsy revealed chronic interstitial nephritis.

Hirsch (München. med. Wchnschr. No. 30, 1912): Injected July 1, with 0.5 gram salvarsan. Vomiting followed, but the following day felt completely well. On the 12th of July received a second injection of 0.5 gram. For two days he had fever, diarrhea, vomiting and slight icterus. A small quantity of albumin in urine. The third day after injection, tonic and clonic convulsions of the entire body occurred. Consciousness was lost. Cyanosis set in and death.

Kannengiesser (München. med. Wchnschr. No. 34, 1912): Patient aged 29. Had syphilitic injections of two years' standing, receiving treatment with salicylate of mercury and one subcutaneous injection of salvarsan on the 6th of April, followed by vertigo and difficulty of hearing. On the 28th of April received 0.5 gram of salvarsan intravenously. No reaction followed. On the 11th of May he received another injection of 0.5 gram, followed by slight headache the next day. Urine negative. Three days after the injection patient was attacked by tonic and clonic convulsions. During these convulsions he lost consciousness, and bloody froth appeared in the mouth. Later on coma set in. He died on the fifth day. The autopsy showed chronic leptomeningitis with brown atrophy and degeneration of the heart and kidneys.

Many other cases are obtainable, but the above were selected on account of their similarity to the one which happened at this hospital. The exact status of the Herxheimer reaction seems to be somewhat in doubt, but most authorities seem to regard it as a phenomenon observed after antisyphilitic treatment due to an aggravation of the syphilitic processes; characterized by exacerbations of skin lesions, mucous patches, gummata, and such nervous reactions as are seen in the augmentation of various paralyses and the lancinating pains of locomotor ataxia, etc. It would seem advisable as the literature abounds in fatalities occurring after both salvarsan and neosalvarsan injections, to ascertain by history and functional tests, the exact status of the kidneys in all cases where the slightest doubt exists as to the patient's ability to stand the dose.

COMMENT BY THE UNITED STATES NAVAL MEDICAL SCHOOL.

Although various causes have been ascribed to the accidents following salvarsan administration, the symptoms are very similar. Almost invariably, the susceptible individual has given an early warning by alluding to peculiar sensations of taste, flushing of the face, choking sensations, or nausea. These symptoms often disappear within a half hour, but further indications of a hypersensitive vascular system are followed in from three to six hours by more severe manifestations, including headache, nausea, vomiting, diarrhea, chills, fever, malaise, and pain in the back and legs. Suppression of the urine beginning at this stage is a most serious symptom and should prompt immediate treatment. With persistent vomiting and diarrhea collapse often occurs in from one to four days, ending in convulsions, coma, and sometimes death.

Pathology.—Lesions of the liver, kidney, stomach and intestines have been described, but it is surprising to find in the autopsy records of the more recent cases reports of normal organs or only cloudy swelling of the same.

G. E. Nesbitf[1] describes a case dying in convulsions and coma with petechial hemorrhages beneath the pericardium, beneath the pleura, in esophagus and mediastinum, with no cerebral hemorrhages. The heart, liver, lungs, stomach, intestines and kidneys were normal.

A. E. B. Wood[2] in a fatal case found only hemorrhages beneath the epicardium and a marked congestion of the surface of the brain with immense dilatation of the superficial blood vessels.

Willcox[3] concludes that in cases of death there is little but degenerative changes of a fatty nature or cloudy swelling with rarely localized lesion—as hemorrhage from a cerebral vessel.

Ehrlich[4] himself lays great emphasis on the lesion "encephalitis hemorrhagica," which he believes to be caused first by a liberation of endotoxins by the killed spirochaetes, and secondly, by a colossal dilatation of the irritated vessels through the direct action of the arsenic "when the normal regulator of the vascular system, adrenalin, is present in insufficient quantities in the blood."

Pearce and Brown[5] have studied extensively the lesions produced in the kidneys and adrenals of experimental animals by a number of arsenical compounds. They show that in the kidney vascular lesions, consisting of dilatation and congestion of the blood vessels, especially in the boundary zone of the cortex, with numerous hemorrhages, dominates the picture. However, degeneration and necrosis of the epithelium of the tubules is pointed out. In the adrenals the picture includes congestion, hemorrhage, cell necrosis with regeneration, and reduction of the chromaffin content.

In experimental work undertaken at the United States Naval Medical School we have been able to demonstrate an acute nephritis of hemorrhagic type and lesions of the adrenals, consisting of congestion, hemorrhage and necrosis of the medullary cells after moderate doses of salvarsan. Further work in this subject is planned.

In the case above reported sections from brain, liver and kidney were examined. The brain showed no lesion and no excessive congestion. The liver was normal. The kidney showed a thick, fibrous capsule. The blood vessels were everywhere dilated and packed with cells. Some of the smaller vessels seemed to be so affected as to allow the escape of blood. Hemorrhage was found throughout the tissue, but especially in the subcapsular zone. The glomeruli were enlarged and filled with blood, but in only a few cases was there free blood in the capsular space. In some instances there were desquamated epithelial cells and hyaline material lying between the glomerulus

and Bowman's capsule. The epithelial cells lining the tubules of the medulla were in many cases greatly swollen and desquamating. Most of the tubules contained some blood but in certain areas they were immensely dilated and filled with blood. Thus it would seem that this case resembles as far as the kidney is concerned experimental salvarsan poisoning. However, these lesions may well be a part of the picture produced by a paralyzed vascular system. In other cases the excessive dilatation of the cerebral vessels is probably a part of a similar process, as Ehrlich suggests, when there is an insufficient amount of adrenalin in the circulation.

Special emphasis is laid on the part which adrenalin in the circulation plays. From the work of Pearce and Brown and our work here it would seem that the injury to the adrenals is an important factor in the more serious cases.

Treatment.—Ehrlich early advised the use of adrenalin in the treatment of severe reactions after salvarsan. Wood[2] reports recovery in two cases after collapse had occurred when treated with 20 minims of a 1–1,000 adrenalin hydrochloride solution every four hours. A third case, untreated, resulted in death.

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(2) J. Roy. Army Med. Corps, London, 1915, vol. 24, p. 272.
(3) Brit. Med. Jour., 1916, vols. 1 and 2, p. 473.
(4) Brit. Med. Jour., 1914, vol. 1, p. 1044.
(5) Jour. Exper. Med., 1915, vol. 22, p. 517.

A CASE OF SYPHILIS OF THE LUNG.

By A. B. Davidson, Passed Assistant Surgeon, United States Navy, and E. Callaway, Assistant Surgeon, United States Naval Reserve Force.

Syphilis of the lung, according to the authorities on the subject, is a rare disease. Osler states that it was found in only 12 cases in 2,800 autopsies at Johns Hopkins Hospital. Post mortems, however, do not really give a true basis for conclusions as to the frequency of the condition, as these cases are practically all tertiary, while in actual practice there are many cases of secondary syphilis of the lung.

The diagnosis of this condition is not hard if its possibility is kept in mind, but the symptoms are usually of such a mild type that they may be easily overlooked. In fact, the condition is in the majority of instances discovered in the course of a routine physical examination when the patient's complaint points elsewhere. The condition is associated with a low-grade temperature, ranging from 100° to

101°. The patient may or may not complain of a cough or of a slight pain in his chest. There is a sensation of weakness, dizziness, and pain in head and back, which may be misleading. On physical examination an area of dullness is found, there is bronchial breathing, increased fremitus, but few or no râles. The primary sore may be found or a secondary rash may be appearing. Examination of the sputum is negative for acid-fast organisms and a total leucocyte count shows a very slight or no increase above the normal. When given antisyphilitic treatment the condition rapidly clears up. The Wassermann reaction is, of course, positive.

F. M., seaman, second class, came to the sick bay on June 27, 1917, complaining of headache, weakness and a slight pain in his chest. On examination an area of consolidation involving the upper half of the right lung was found. All lymph nodes were swollen and a small condyloma was found beneath the prepuce. The patient admitted having had a chancroid there four months previously. The temperature was 101°. The next day his condition was the same and a total leucocyte count gave only 7,500. On this day and the next the sputum was examined for the B. tuberculosis, but none were found. There was noticed a beginning alopecia and mercury in the form of the succinimide was given intramuscularly. By the 6th of July six doses had been given and the pulmonic condition had entirely cleared up, hair was growing on the bald areas, and the condyloma was almost gone. The patient was transferred to the United States Naval Hospital, Norfolk, Va., where the Noguchi test was found to be 4 plus positive.

That this was a case of syphilis of the lung is apparent, as the low temperature and normal leucocyte count rule out pneumonia. Tuberculosis is eliminated by the absence of the bacillus in the sputum and the rapidity with which the condition cleared up when mercury was administered.

Two other cases almost identical with the one given above have been observed, and it is believed that the condition is more common than is usually supposed.

A CASE OF FRACTURE OF THE OS CALCIS.

By G. S. WHITESIDE, Assistant Surgeon, Medical Reserve Corps, United States Navy.

Fractures of the tarsal bones, especially of the os calcis, are unusual except as the result of crushing injuries to the foot. The problem of diagnosis is a difficult one, where the calcaneum alone is injured, both because swelling of the foot and ankle obscures the outline of the bones and because it is often impossible to elicit crepitus on account of the wide separation of the fragments.

Hamilton states that "the calcaneum is occasionally broken by lateral pressure but much more often by a fall upon the foot or rather the heel." Several cases have been reported of fracture of the tubercle of the os calcis by falling upon the foot when in the position of varus. This lesion has been ascribed to the sudden stress on the middle portion of the external lateral ligament. Gray's Anatomy describes this as follows: "The middle fasciculus (ligamentum calcaneofibulare), the longest of the three parts of the external lateral ligament, is a narrow rounded cord passing from the apex of the external malleolus downward and slightly backward to a tubercle on the outer surface of the os calcis, near the middle of the external surface of the bone. This ligament is covered by the tendons of the peroneus longus and brevis." Sometimes the calcaneum may be fractured by a rending force owing to the sudden action of the gastrocnemius-soleus muscle. This may occur in jumping or in falling upon the toes with the foot in the position of varus. In the event of such an injury the lower part of the insertion of the tendo Achillis may be torn away from the bone leaving it attached only to the upper fragment. In such cases the upper fragment is pulled more or less vertically upward. The consequent separation of the fragment from the main body of the bone is a wide one, and so crepitus can not be obtained even when pressure downward is made by the examiner's hand.

Whether this particular lesion of the os calcis is always caused by a fall upon the toes with the foot in the position of varus or whether it may sometimes be caused by a more direct violence, as in falling from a height upon the heel, we have no available statistics to show. When X-ray examination is not to be had the diagnosis may be very baffling. Under ether a hard mass, giving the impression that it might be bone, can be felt above the normal upper level of the os calcis, unless swelling of the foot and ankle is too great. In the case here reported the man was washing windows on the outside of the marine barracks. He fell, while facing the building, alighting upon his feet in such a way that one of them violently struck the edge of the concrete sidewalk. The man was examined within a few minutes of the accident. Consequently very little swelling of the foot had taken place. Even so the diagnosis of the exact lesion was in doubt until an X-ray plate, taken by Passed Assistant Surgeon R. G. Davis, made the position of the fragment very evident.

The apparatus for the nonoperative treatment of fractures of the os calcis, as generally advised, is some form of slipper or shoe to the heel of which is attached a cord. This cord is to be fastened posteriorly to a bandage about the thigh just above the knee. Or the foot may be put up in a position of extreme varus and held so either by an anterior dorsal splint or by plaster of Paris. These

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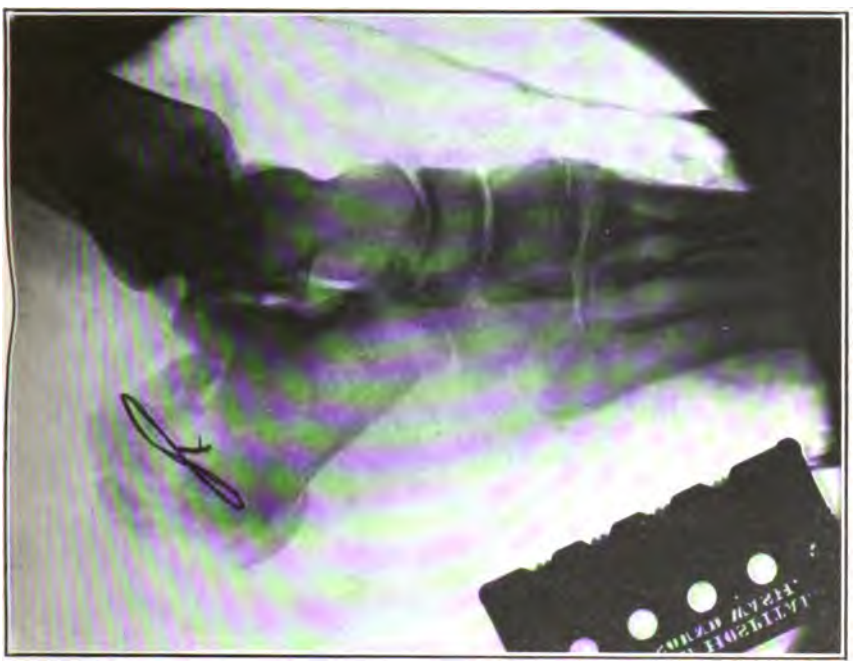
Fracture of os calcis.

Approximation of fragments immediately after operation.

268–2



View of os calcis two months after operation.

methods are merely mentioned here to be condemned, unless the circumstances are such as to contraindicate open operation for fixation of the fragments.

Any mechanical attempt at reduction and fixation can be only partially successful in regard to approximation of the fragments and will therefore entail a very long convalescence. Open operation, wiring of the fragments and fixation in position of varus were therefore the measures decided upon for this case.

Upon exposing the bone lesion to view by a long semilunar incision, convexity backward, on the outer aspect of the foot, it was readily seen that approximation was not possible by merely putting the foot in position of varus. Therefore an intrathecal tenotomy of the tendo Achillis was done as high as possible in the upper angle of the wound. After drilling, one doubled strand of silver wire was passed, without difficulty, from above downward through both fragments. Tension upon this wire gave close approximation on the outer side of the bone, and a near approach to approximation on the inner side. It was deemed impossible to pass another wire on the internal side without an incision for the purpose on that side. This was not considered justifiable. The wound was closed without drainage and the foot put up in a position of varus.

Very little pain was experienced after operation. Convalescence was uninterrupted. The following is the health record in the case:

MEDICAL HISTORY.

A. & T. Name of patient, Merriam, Howard S.
Marine Barracks, Puget Sound, Wash.
July 28, 1917.
Fracture Os Calcis, right; simple.
Line of duty; from a fall sustained while washing windows.
Transferred to United States Naval Hospital for further treatment.

M. G. WRIGHT,
Assistant Surgeon, United States Navy.

R. A. United States Naval Hospital, Puget Sound, Wash.
July 28, 1917.
Fracture, simple; Os Calcis, r. "G."
Origin: Duty, as related above. X-ray shows fracture of os calcis at insertion of tendo Achillis, with wide separation of fragments.
Open reduction advised and accepted.
7–30–17. Operation: Semilunar incision inner side heel. Tenotomy of tendo Achillis about 2 inches above attachment. Double strand of silver wire through upper and lower fragments. Approximation good. Foot put up with anterior splint in extreme extension.
7–31–17. Temperature normal.
8–3–17. Splint removed. Plaster of Paris applied, keeping foot same position.
8–11–17. Wound all healed.

8–28–17. X-ray shows excellent result. Can now walk on foot. All dressing off.

GEO. S. WHITESIDE,
Assistant Surgeon, M. R. C., United States Navy.

Sept. 10, 1917. Progress continues favorable. Walks well. No soreness.

9–12–17. On 10-day leave of absence.

D 9–24–17. Discharged to duty; cured.

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WALDO RICHARDSON,
Assistant Surgeon, United States Naval Reserve Force.

Approved:

A. R. WENTWORTH,
Medical Director, United States Navy, in Command.

The X-ray picture taken by Dr. Davis immediately after operation showed good approximation of fragments.

Another X-ray taken at the end of two months showed excellent position and wire still in place.

The eventual functional result is reported as good. Discharged to duty, well, 58 days after operation.

This or some similar method of open operation would seem to be best for such an injury, obtaining as it must, accurate approximation, rapid repair, and consequently fewer days' loss of service.

EXTRACTION OF A SUPERNUMERARY TOOTH.

By W. A. CAUCH, Dental Surgeon, United States Naval Reserve Force.

It is a well-known fact that the teeth of mammals are 44 in number, and, in the evolution of the human, man has lost 4 incisors and 8 premolars or bicuspids. Many authorities suppose that supernumerary teeth are some of these suppressed teeth reappearing in a rudimentary form. Supernumerary teeth are usually found in the incisor region and almost always erupt just before the permanent set, causing irregularities in the incisors.

Anomalies seem to be not uncommon, as they appear in almost every collection of models of the teeth. They sometimes remain embedded in the alveolar process and are revealed only by probe or skiagraph.

A man with a supernumerary tooth recently reported at the dental office, headquarters of the twelfth naval district. The tooth was extracted under local anesthesia. It was located in the median line of the hard palate about half an inch back from the alveolar process.

Supernumerary or anomalous teeth very rarely resemble any of the typical tooth forms and are mostly peg shaped or conical, as was true in this case.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Surgeon H. S. CUMMING, United States Public Health Service.
Passed Assistant Surgeon G. B. TRIBLE, United States Navy.
Passed Assistant Surgeon D. G. SUTTON, United States Navy.
Passed Assistant Surgeon R. W. MCDOWELL, United States Navy.
Passed Assistant Surgeon G. F. CLARK, United States Navy.
Passed Assistant Surgeon W. A. BLOEDORN, United States Navy.
Passed Assistant Surgeon G. B. CROW, United States Naval Reserve Force.
Assistant Surgeon J. E. HOUGHTON, United States Navy.
Assistant Surgeon R. A. KERN, United States Navy.
Dental Surgeon J. R. BARBER, United States Navy.

GENERAL MEDICINE.

BASSETT-SMITH, P. W., LYNCH, G. R., MANGHAM, S. **Investigation of carrier problem in prevention of cerebro-spinal fever (examination of 11,000 non-contacts).** J. Roy. Nav. M. Serv., London, October, 1917.

A continuous examination has been carried out at the Royal Naval College, Greenwich, for carriers of meningococcus in the naval forces employed at and passing through the Royal Naval Depot at Crystal Palace.

All men on entering the depot and as many as possible of those about to be drafted out were tested.

The fact that the three investigators and laboratory staff remained unchanged adds to the value of the observations.

The number of carriers detected was considerable (676) and three points were established:

1. The percentage of carriers found this year is much higher than it was during last season—(6.14 per cent, as against 1 to 2 per cent).

2. On dividing the men examined into two groups, new entries and drafts, a higher percentage of carriers is found among the latter—(4.48 per cent, as against 10.08 per cent).

3. The carrier stage is more persistent than was the case last year.

The percentage of positives among new entries increased steadily up to the end of May, after which time there were indications of a decrease, probably due in part to better climatic conditions. Occasionally there would be a batch in which the percentage of positives

rose very high. This was marked in a number of merchant seamen and possibly due to the men having come from overcrowded areas.

There was a much greater increase in the percentage of positives among the men who had been some time at the depot and were to have been drafted out. The investigators attribute this to local infection.

The detected carriers have been completely isolated until they have given two consecutive results at weekly intervals. They are then sent to duty, but before being discharged they have to obtain four consecutive negatives.

The weekly records show how frequently the former give subsequent positive results, i. e., are "intermittent carriers." Necessarily these and other undetected carriers associating with large bodies of men in a depot must tend to disseminate the organism and cause a higher incidence among the residents of the depot. This view is strengthened by the demonstration of changes of type found in carriers.

The persistency of the carrier stage has been a marked feature. Of course, a large proportion of the cases came under Gordon's heading of "temporary carriers," i. e., one positive was obtained. The men were segregated, by treatment or normal processes, became free and four successive negatives were obtained. On the other hand, cases with five, six, seven, or even nine positive results were obtained, generally with some intermittency.

The following gives the frequency of positives found per carrier of the 676 carriers discovered in the first 11,000 noncontacts examined, and the record of their subsequent swabs is considered up to June 6, 1917.

Number of times found positive	1	2	3	4	5	6	7	8	9
Number of cases	459	126	49	23	13	3	2	0	1

A number of the men were still under observation, as they had not shown four negative results. It will be seen that the temporary carriers were far more numerous than all of the others. It has been decided that the very chronic carriers, if not cleared up in three months, are to be discharged from the service.

Including the examination of contacts, recovered cerebro-spinal fever cases, and reexamination of carriers up to June 6, 1917, the total number of swabs dealt with was 14,598, of which 1,103, or 7.5 per cent, gave positive results. Of 11,000 healthy noncontacts 676, or 6.14 per cent, were found positive.

The total number of cultures from these 11,000 cases, to which the agglutination test was applied, using Flexner's serum, was 1,609, of which 676, or 42.01 per cent, gave positive results.

Occurrence of some types of swab records is given below:

+	+	−	−	−	−				53 of this type.
+	+	+	−	−	−	−			9 of this type.
+	+	+	+	−	−	−	−		8 of this type.
+	−	+	−	−	−	−			19 of this type.
+	−	−	+	−	−	−	−		15 of this type.
+	−	−	−	+	−	−	−	−	11 of this type.
+	−	+	+	−	−	−	−		1 of this type.
+	−	+	−	+	−	−	−	−	3 of this type.

A table is appended showing the number of cases each month and the results of examination of their contacts, together with the figures relating to noncontacts. The highest incidence of cases occurred during the months of January, March, and April, when the weather was exceptionally cold.

Month.	C. S. M. cases.	Contacts.		Noncontacts.									Total swabbed.
		Total.	Positive.	New entries.	Positive.	Per cent.	Drafts.	Positive.	Per cent.	Officers.	Positive.	Per cent.	
1916.													
December	2	12	2	1,490	21	1.4							1,490
1917.													
January	4	25	1	1,056	38	3.59	867	43	4.95	115	3	2.60	2,038
February	2	4		841	33	3.92	676	36	5.32	71	6	8.45	1,588
March	6	28	7	1,515	73	4.81	802	84	10.47	67	3	4.47	2,384
April	4	21	8	1,158	63	5.44	666	97	14.56	141	4	2.83	1,965
May	1	6	1	1,717	121	7.04	380	82	21.57	107	11	10.28	2,204
Total	19	96	[1] 19	7,777	349	4.48	3,391	342	10.08	501	27	5.38	

[1] 19.8 per cent.

From the 676 noncontact carriers 381 examinations were made to determine the type of Gordon strain, which was the causal organism. The following results were obtained:

Gordon type	1	2	3	4
Number of times found	167	176	2	31

In five cases the cocci were agglutinated by both types 1 and 2. There were 19 cases of cerebro-spinal fever during the period and of 14 contacts tested, by far the largest number showed type 2. Technique: The swabs are taken by one officer (using West's method) and sown on plates which are then spread by another officer. The medium which gave the best results for plates was trypsin legumin agar to which 1.5 per cent of laked ox blood (prepared according to Wilson, Brit. Med. Jour., Dec. 30, 1916) was added just before the plates were poured. The plates are incubated for 24 hours at 37 C. and suspicious colonies are examined by Gram's method. Colonies are

translucent, slightly convex, and somewhat milky by reflected light, and are easily recognized.

The writers have eliminated the use of the glucose and saccharose peptone waters and inoculate from the plate directly on trypsin legumin agar slopes which are incubated for 24 hours. From these emulsions were made in formalinized saline (0.5 per cent phenol now used instead). The emulsions are heated at 60 C. for 30 minutes and tested for agglutination with Flexner's polyvalent serum at dilutions of 1 in 100 and 1 in 200; controls with normal serum, 1 in 50 being employed. The agglutination tubes are heated at 55 C. for 18 to 24 hours and then read off.

The investigators advocate the use of Flexner's polyvalent serum. They found that a pure pathogenic meningococcus from cerebro-spinal fluid has failed to agglutinate with any of the four Gordon sera though reacting well with Flexner's serum. This method also saves time and material. They are of the opinion that morphologically and tinctorially correct cocci can only be absolutely identified as meningococci by agglutination with specific meningococci serum. The appearance of colonies on the plate and the sugar reactions are far too comprehensive and take too much time.

Preservation of living cultures of meningococci.—The investigators have found trypsin wheat-germ agar in stab cultures most satisfactory, cultures living for six weeks when evaporation is prevented. Egg medium is also good, cultures living for a month. Cultures from the nasopharynx did not survive well. The authors, in reply to the criticism that carrier work is of little value, owing to the inability, in the light of present knowledge, to differentiate between pathogenic and nonpathogenic strains of meningococcus, conclude that in widening the net by improved technique, etc., so as to include, isolate and treat all carriers, good work is being done to modify the incidence of the disease still seriously on the increase. "As this year the total carriers have been shown to be far higher than last year, and assuming that the ratio, although unknown in figures, remains the same between pathogenic and nonpathogenic strains, one hesitates to speculate upon what might have been the disease incidence if this isolation had not been carried out."

The authors note that in none of their cases did a carrier develop the disease, though capable of infecting others, but of seven recovered cerebro-spinal fever cases three showed meningococci in the nasopharynx, the organism having been discovered five times in 31 examinations. Finally the authors are strongly of the opinion (1) that it is of the first importance, as suggested by Col. Gordon, to make every endeavor during the summer months to detect and eliminate or cure all chronic carriers who may be present in the depots before the commencement of the next winter season; (2)

that the importance of very thorough ventilation of all dwelling accommodations should be recognized as a preventive measure. They point out the fact that at the Royal Marine Barracks, Deal, where these precautions were observed, not a single case occurred though the disease was prevalent in the town itself.

(H. S. C.)

FERRY, N. S. **The rationale of pollen extract therapeusis of hay fever.** Interstate Med. Jour., September, 1917.

The theory is generally accepted that the symptom complex known as hay fever is due to a toxemia depending upon a parenteral digestion of proteins of certain pollen. Although Dunbar's work in establishing the etiological relationship of pollen to hay fever is recognized, it has been proved that his conception that pollen extract is a true toxin is erroneous. Dunbar, Noon and Freeman demonstrated that the application of very minute traces of pollen or its aqueous extract to the conjunctival or nasal mucous membrane produced the most intense symptoms of hay fever in persons sensitive to that particular pollen, and produced no symptoms in those not suffering with the disease. This experiment not only afforded a means of differentiating between those individuals subject to one pollen from those subject to another, and of determining the exact resistance of any patient to any given pollen, but it also proved that hay fever depended upon an individual predisposition. Coupling this predisposition with the fact that pollen extracts are considered of a protein nature led many, following Wolff-Eisner, to believe that anaphylaxis was the underlying cause. This conception that hay fever is based upon anaphylaxis or protein-hypersensitiveness presupposes that the patient must at some previous time have been sensitized, and according to Koessler this sensitization may have been either inherited or acquired. Several explanations are offered regarding the manner in which this sensitization may be acquired, but whatever the method of its acquirement, Cooke, Flood, and Coca believe that the mechanism by which it may be relieved is the same as that of desensitization in experimental anaphylaxis.

The author believes that desensitization against pollen protein can best be accomplished by the subcutaneous route, starting with extremely small doses of standardized aqueous extract of the pollen and gradually raising the tolerance by increasing the size of the dose. By using the method of Noon and Dunbar to make correct diagnosis and to determine the size of the initial dose he believes that there is practically no danger in the treatment, provided single extracts are used. He has found that aqueous extracts prepared according to his own method remain active for at least one year.

In reporting 118 cases treated with ragweed pollen and 9 cases treated with timothy pollen the author states that 71 per cent of cases were relieved of practically all symptoms, and 16 per cent were more or less benefited. Even in the cases most benefited, the effects gradually lessen and disappear entirely in two or three years.

(G. B. C.).

BONIME, E. **The utilization of the immune response in renal tuberculosis.** Am. Jour. Med. Sc., October, 1917.

Owing to the absence of characteristic symptoms and the lack of training of the average physician in the diagnosis of urinary diseases, renal tuberculosis is usually not recognized until great and irreparable harm has been done. Without disparaging the value of cystoscopy and guinea-pig inoculation as diagnostic aids, the writer makes a plea for the use of tuberculin, given subcutaneously, as a valuable diagnostic method and one that the average physician can use.

The usual "present-day" treatment of the disease is confined to hygienic, dietetic, and climatic measures in those cases recognized fairly early, with the addition of nephrectomy in more advanced cases. Few, if any, advocate the removal of the kidney in early cases. In the writer's opinion the value of immuno-therapy is not sufficiently appreciated. The general physical condition of early cases is usually good, but the measures employed in their treatment are not sufficient to start the immune response, because the mechanism of immunity is faulty. The stimulation of this mechanism by the use of tuberculin appears logical, and in practice it gives good results. He believes that with the safer method employed at the New York Polyclinic Hospital there is no difficulty in its utilization in private practice.

Prophylactic immunization against mixed infection he regards as also of very great importance. Bacteria are constantly being carried through the kidneys, and in the tubercular kidney other organisms find a favorable soil for growth. Inoculations with a mixed-stock vaccine of colon bacilli, staphylococci, and streptococci are advocated in every case. If mixed infection occurs, it should be treated by autogenous vaccine in addition to the use of tuberculin. Too many blame tuberculin for failure to cure a mixed infection.

So much for fairly early cases. What of the other and radical method of treatment? The removal of the kidney can only remove a portion of the infection. The primary source of infection, usually the mesenteric glands, remains, and removal of one kidney does not prevent the spread of the infection from the primary focus to the other kidney. On the contrary, the lowered resistance produced tem-

porarily, at least, by the shock of the operation tends to increase the chance of such infection. The operation itself can not increase the individual's immunity. Bonime believes that it is better to use tuberculin, even in advanced cases, in the hope of increasing the resistance and effecting a possible walling off of the infection.

The complexity of the mechanism of the urinary apparatus should always be borne in mind, for symptoms due to distorted or destroyed portions of this apparatus may persist after the tubercular process is no longer active, and such symptoms be wrongly interpreted. He believes that an early diagnosis and the prompt use of tuberculin in the treatment of the disease would result in a far more favorable prognosis.

(G. B. C.)

TWICHELL, D. C. **Reactions to altitude in the tuberculous.** Am. Jour. Med. Sc., December, 1917.

The author has had opportunities for extensive observations on the tuberculous at altitudes varying from near sea level to from 5,000 to 6,000 feet, and his conclusions regarding the value of altitude in the treatment of tuberculosis should be of interest not only to workers in this particular field but to the general practitioner who is called upon to advise and treat this class of patients.

The following is a summary of the changes that take place in the blood, blood pressure, and tuberculous symptoms upon removal from a low to a high altitude.

All investigators who have worked along these lines are agreed that the red blood corpuscles are increased by a high altitude. Low barometric pressure has been shown to increase the activity of the red bone marrow, as evidenced by its hyperæmia and increased number of nucleated red cells. The Anglo-American expedition to Pike's Peak showed that this increase was actual and not relative. It has been shown that this increase is probably temporary, the period of abnormal increase varying in different individuals. Increase in the haemoglobin content of the blood accompanies transfer to high altitudes. There is marked increase in the mononuclear lymphocytes in the circulating blood at elevations of 6,000 feet. An increase of blood platelets has been demonstrated by Webb but the function of these platelets is not clearly understood as yet. The modification of blood pressure at high altitudes appears to vary with the individual, there being a rise in some cases and in others no change or even a lowering of the pressure.

Tuberculous symptoms such as cough, expectoration, and fever are not strikingly altered by residence at high altitude. The gain in weight in favorable cases corresponded with the gain usually ob-

served at low altitude but advanced, semichronic and chronic cases are liable to lose weight or not gain weight or gain very slowly, on coming into a high altitude in dry seasons, in the face of clinical evidence or improvement in symptoms, signs, and general well-being. In high and dry altitudes night sweats were of very rare occurrence after the first few nights of change from low altitude. The author believes hemorrhage from the lungs to be rarer at high altitudes than at lower levels. Pleurisy with effusion is more rare at high altitudes.

The author believes that the circulatory mechanism works to better advantage at altitudes of moderate degrees (5,000 to 6,000 feet) than at sea level. The lowered atmospheric pressure may at first cause a disproportionate dilatation of the venous and arterial systems and so increase the capacity of the blood cavities of the body. The blood-forming organs would respond to such an increased capacity as they would to loss of blood by increasing the elements of the blood. The thinner walls of the veins may result in partial stasis of the venous circulation which might have a distinct beneficial effect on disease lesions following the theory and results obtained in Bier's hyperemia treatment.

Mountain sickness offers a similar example of circulatory change. The anoxemia which results from the lower barometric pressure depresses the cardiac function resulting in accumulation of blood in the venous system. This would lead to plethora of the lungs and general venous system and provoke the clinical symptoms characterizing mountain sickness. Various observers have confirmed the view that active absorption of oxygen by the alveolar epithelium is an important, if not the only force behind its appropriation by the blood when the CO_2 tension in the alveolar air falls below a certain critical tension. It has been shown that the suboxidation of the tissues resulting from a critical lowering of alveolar oxygen tension is accompanied by the accumulation of acid substances in the blood which stimulate the respiratory center and lower its threshold of irritability for CO_2.

A large proportion of tuberculous cases on coming into an altitude show an immediate reaction as evidenced by such symptoms as increased shortness of breath, increased cough and expectoration, cyanosis more or less marked, and an increase of moist sounds in the lungs. This immediate reaction subsides in a few days.

A certain proportion of cases show no reaction at all. Another group of cases, chiefly chronic, shows symptoms of sudden toxemia, such as high fever, rapid pulse, nervousness and insomnia, diarrhea, and signs of increased inflammation in the lungs. These cases usually recover rapidly, as is the case in classical tuberculin reactions. These reactions to altitude frequently are followed by periods of marked

improvement in the signs and symptoms of disease, as is also observed after artificial tuberculin reactions.

It would appear that there is definite scientific basis for the time-honored faith in the curative effect of altitudes in the treatment of tuberculosis.

(W. A. B.)

CAVALLINI, E. **Prevention of malaria.** Ann. Med. Navale e Coloniale, II, p. 364, 1914.

The Italian naval vessel *Volturno* was for two years in the waters off a highly malarious section of East Africa (Dar-es-Salam and Mombasa). Each man on board received daily a compressed tablet of a quinine salt, 0.20 gram. The crew was lined up on deck every morning and the administration of the prophylactic dose was conducted under the supervision of an officer. The ship was anchored as far as possible from shore, liberty was granted only till sundown, and all electric bulbs were tinted blue to reduce the attraction of mosquitoes by light.

In a complement of 150 officers and men there developed but four cases of paludism. Fifty per cent of the crew of a German naval vessel, on which was employed the prophylactic method of administering 2 grams of quinine a week, divided into two doses, developed malaria. The German medical officer was so impressed with the difference in health conditions on the two ships that he called on the *Volturno* and requested the medical officer of that ship to inform him of the methods adopted.

MENTAL AND NERVOUS DISEASES.

FELL, E. W. **Notes on diagnostic value of spinal fluid and Wassermann test in psychiatry.** Am. Jour. Insan., July, 1917.

From a series of 215 cases the author gives a concise and valuable expression of his opinion relative to certain fairly well-known facts in relation to spinal fluid findings in psychiatry. He brings out no essentially new facts, but emphasizes many of the formerly recognized conditions, and because of the fact that his conclusions were drawn from results obtained in such a large number of cases it is believed that they are particularly valuable.

It is recognized by most authorities that the nervous tissue is sensitized at the time of the primary and secondary symptoms in luetic infections. The Wassermann at this time is usually positive. Some claim that a particular strain of spirochaete predisposes to cerebral

spinal syphilis and others that the resistance of the individual plays an important rôle in the development or nondevelopment of cerebral spinal symptoms subsequent to the primary infection. It is a well-recognized fact that very frequently we get a negative history as to severe secondary symptoms in cases of syphilis that subsequently show symptoms of cerebral spinal involvement. In a large percentage of cases of paresis developing in men of the service and subsequently sent to St. Elizabeths Hospital for treatment we are unable to find a definite history of either primary or secondary symptoms. In these cases we may get a history of chancroid with no subsequent skin lesion, or we may get a history of a definite primary lesion with no record of secondary symptoms of any kind. However, there is, of course, a large percentage of cases that seem to have the typical luetic symptomatology, and these usually are apparently cases with very severe infections, and run a more or less rapid course. The author attempts to show that during the secondary stage there is a certain chain of symptoms which usually develops, but which is frequently unrecognized. The symptoms are referable to the mental field and appear as evidences of mild psychoses. the type simulating frequently the manic-depressive group, more frequently the manic phase.

In 215 luetic cases the average cell count was 50 and the highest 285. Ten of the 285 in the nonluetic group had over 6 cells. Seven of these 10 cases turned out to be organic in nature, and the remaining 3 were of dementia praecox. In the luetic group no relation was noted between the cell count and globulin increase, except that in acute cases there was a greater amount of globulin and a larger number of cells. In the luetic group 91.6 per cent of the cases gave a positive Wassermann reaction with the blood serum. With the spinal fluid in the luetic group 30 of the 215 cases gave a negative Wassermann in one of the 3 dilutions used. Seventeen of these 30 had low cell counts. Of the nonluetic group, 22 of 285 gave a positive Wassermann in some of the fluid dilutions, but in the majority of the cases the Wassermann was negative. The cell count and globulin increase was not unusual in the organic cases. The author expresses the opinion that a diagnosis of paresis should not be made unless neurological signs are present, as well as definite laboratory findings. As to the Lange reaction the author found that it was typical in cases of definite paresis. In cerebral spinal syphilis he got a paretic reaction in a high percentage of cases. Nonspecific organic cases may give the same reaction as with paresis. He emphasizes the fact that in cases of paresis, with remission, showing a positive spinal fluid finding should not be considered as a cure.

(D. G. S.)

SCHWAB, S. I. **The newer concepts of the neuroses: Their clinical value.** Am. Jour. Med. Sc., September, 1917.

Just at this time, when there is apparently so much diversity of opinion as to the actual value of the Freudian and various allied theories in their relation to the treatment of psychoses and psychoneuroses, the above-mentioned article is considered to be quite timely and to be recommended for careful reading by those who are interested in this phase of the work.

To begin with the author gives very clear definitions of various neuroses according to the present-day classification. He considers the neuroses as a whole to be merely clinical pictures of the diseases which are primarily psychogenic in origin. He divides the neuroses under the two general headings of, "conscious" and "unconscious." Under "conscious" he places neurasthenia, hypochondriasis, and psychasthenia; in the "unconscious," hysteria and the compulsion neuroses. He then goes briefly into the principles of the Freudian theory, the theory of Janet, the theory of Babinsky and finally that of congenital and acquired inadequacy. He reminds us that under the Freudian theory the psychoneuroses are divided into two groups. Neurasthenia is a neurosis of anxiety being due to various sexual troubles, while hysteria and obsessions are due to sexual causes of traumatic origin occurring in childhood. Psychiatrists limiting themselves entirely to the Freudian theory have been more or less discredited from time to time because of the fact that as a result of their psychoanalysis of various cases they have failed to involve sexual matters as a basis for the existing condition. The author recognizes the fact that sexual disturbances are the cause of a large number of cases of neuroses under treatment, but emphasizes the importance of remembering that the method of Freud is the important element. To uncover the causative factors which have been buried in the patient's subconscious mind is the goal to which every psychoanalyst should strive. There have been a number of cases in the reviewer's experience that have not responded to psychoanalysis because of the fact that the physician formerly handling the case laid stress on sexual matters as being the main causative factors underlying the illness, when as a matter of fact the condition was not sexual in character, but was in the form of some unpleasant incident which had occurred at an early date in the patient's life and had been repressed for obvious reasons. A full knowledge of any case can only be gotten by careful and detailed review of the patient's life from childhood; analysis of character, personal association and dream interpretation. The author lays special stress on suppression by the patient of unpleasant ideas, which have set up a conflict resulting in outward expressions of seemingly incomprehensible symptoms from the motor and sensory fields. (D. G. S.)

SWIFT, H. F. **Types of response in treatment of syphilis of the central nervous system.** Am. J. Syph., St. Louis, July, 1917.

After discussing modern treatment of syphilis of the central nervous system, in a more or less exhaustive manner, the author cites numerous illustrations giving case histories, spinal-fluid findings, and response to treatment in each case. In conclusion, he reminds us that it is necessary to determine the character of the pathological process present before instituting treatment; that only lesions due to inflammation or exudation respond entirely to therapeutic measures, and that degenerations are rarely, if ever, affected by such means. In cases of tabes dorsalis improvement is noted from the general administration of salvarsan and mercury. On the other hand such cases may require intraspinal treatment which leads in many cases to a permanent arrest of the degenerative process. Treatment should be continued until the spinal-fluid findings are negative. In paresis spinal treatment may increase the number and length of remissions, but the ultimate hope for recovery is slight. When a typical paretic curve is gotten with Lange reaction, even though the clinical symptoms are not typical, intensive treatment should be begun at once for it is only in the early case that we may hope to derive much real benefit from any form of treatment. All treatments should be regulated by spinal-fluid findings and not by clinical symptoms. (D. G. S.)

SURGERY.

GUILLOT, M. and WOIMANT, H. **Sterilization and closure of suppurating fractures.** Surg., Gyn. and Obstet., November, 1917.

After four months of experimentation the writers affirm that fractures in full process of suppuration can be sterilized and closed. They use a special application of the Carrel method. The technique is as follows:

Preliminary disinfection: Operation immediately following the infliction of a wound has been found to be dangerous, often followed by septicemia and death. Infection should first be reduced by discontinuous flushing with Dakin's solution. The progress of disinfection is watched on the bacteriological curve on the chart. Films are made daily from the highly infected areas and the bacteria counted. They appear in large quantities after two days, then diminish rapidly, except in old fractures, where they appear sooner and diminish more slowly.

Operative treatment: When the existence of foreign bodies, such as fragments of projectiles, clothing, detached bone, etc., is noted, an operation becomes necessary at once. In flat bones or the epiphyses of long bones the treatment is comparatively easy and areas of

osteitis are curetted with the gouge forceps. Old fractures of long bones present more difficulties and the commonly used methods of curettement and abrasion produce infection of the bone marrow and clots of blood in the wound.

The factors to be considered in an operation are: Incision. The incision need not extend beyond the fistula or wound of first operation. Do not use iodine in preparation, as a burn will be produced when Dakin's solution is used later for flushing. All infected tissue should be excised, but enough skin should be retained for future closure of the wound. Osteitis of the periosteal callus is removed by a curette introduced into the infected cavity. In recent fractures no callus is found, and the bone ends are easily exposed. Sequestra may be found in the muscles, focus of fracture, or medullary canal. They should be removed from the muscles after being located by the X-ray. A careful search must be made for those in the medullary canals, for they are often responsible for the absence of the medullary plug observed in the course of the consolidation of fractures. Splinters, decaying or detached, should not remain in the wound, only those necessary for consolidation being left.

Bone ends: The writers are quoted in the following conclusions: (*a*) "A fracture in which the bone ends are obturated causes no postoperative reaction." (*b*) "A fracture in which the bone ends are not occluded produces an intense reaction, if the cavity of the medullary canal is not plentifully flushed with the antiseptic solution." (*c*) "A fracture in which the nonoccluded bone ends have been widely opened by surgical intervention will produce no reaction." Therefore (1) "the surface of the medullary plugs should be explored with a curette in order to ascertain that there is no communication with the subjacent medullary canal and that no sequestrum is inclosed;" (2) "the medullary canals which have remained open should be hollowed out with a pince gouge in such a form as to produce a wedge-shaped cavity communicating freely with the flushing tubes."

Sterilization: It was found that the most highly infected parts of the wound were the blood clots near the severed bones. To prevent their formation the bleeding vessels were clamped and ligated, then sterilized with salt solution at 40 C. During the first two days the wound is flushed out every half hour of the day and every hour of the night with hypochlorite prepared electrolytically. This procedure has been found to decrease the bacteria to below three per field after a varying length of time, and then after several days elapse the wound is ready to close.

Closure of the wound: In sterilized fresh fractures no difficulty is encountered in closing the wound. The edges of the wound are freshened, profuse bleeding avoided, horsehair sutures used, bone ends and adherent splinters are brought together by pressure, and cav-

ities obliterated. The same result is obtained in old fractures having no periostal callus. For other classes of fractures it is necessary to use a filling to close the focus of the fracture, so that a cavity will not be left under the sutures. For this Beck's paste, chloramine paste, and adipose graft are used. The latter is most satisfactory, since (1) "it does not require the making of a musculo-aponeurotic layer;" (2) "the graft is always obtainable in the vicinity of the zone of operation;" (3) "it will keep in place, even in cases where, owing to the lack of a sufficient quantity of cutaneous tissue, the wound has remained partially open." It is necessary to use great caution in applying adipose graft, so that no fault of asepsis may result. If sufficient skin can not be obtained to cover an old fracture, the cavity must be allowed to fill spontaneously, the application of chloramine paste preserving its sterility. (R. W. McD.)

PARKES, C. H. **Exploratory laparotomy; its use and misuse.** Surg., Gyn. and Obstet., November, 1917.

A warning note is sounded by Parkes, who deplores the use of explorative laparotomy except in extreme cases and after all other available means of diagnosis have been employed. Too often in modern surgery there are instances of hasty or unnecessary operations, some of which he cites.

1. There is the operation which is begun thoughtlessly and without intelligent diagnosis.

2. There is danger in deciding beforehand exactly what the nature of the operation shall be and proceeding on that theory without examination of the stomach itself after the abdomen is opened. It is most important that the laparotomy "be taken advantage of to determine the possibilities of operative treatment."

3. The surgeon, no matter how busy or important, should not rely on the "snap diagnosis" of others.

4. Above all, the surgeon should have a thorough knowledge of his subject and skill to proceed with the operation after a diagnosis has been established.

Attention is called to the confusion of gastric disorders with chronic appendicitis and to the difficulty, in cases of peritonitis, of distinguishing a surgical from a nonsurgical case. Intelligent preoperative treatment is urged. "It is the disgrace of the commonly understood exploratory laparotomy and kindred procedures—surgical, obstetrical, venereal, laryngological, etc.—which often prompts the layman, and frequently the doctor, to think of medicine as a fake, thus encouraging the Christian Scientist and his kind."

(R. W. McD.)

NOVITZKY, J. **Septic teeth: Their etiology and surgical treatment.** Am. Jour. Surg., August and September, 1917. **Technic for removal of dead teeth.** The Jour. California State Dental Association, November and December, 1917.

In these articles the author presents a revival of the old theory that a tooth without a vital pulp acts as a foreign body to the tissues and is a menace to the health of the tissues of the mouth and to the individual.

A pulpless tooth, or a tooth with a necrotic pulp, is a "dead" tooth and is certain to undergo putrefactive changes, because dentin contains approximately 28 per cent of organic matter subject to the laws of decomposition. Histologically, if the "protoplasmic fluid" could penetrate to or through the granular layer of Tomes, it would not be sufficient to keep up vitality in tooth dentin. The author does not concede that a pulpless tooth may be treated in such a way that it will not putrefy.

The presence of "dead" teeth, necrotic bone, such as the floor of the antrum, or carious alveolar process, may give rise to infections of the dento-alveolar joints of vital teeth, and the condition may be erroneously called pyorrhea. Such conditions have been apparently improved by the removal of such dead structures.

The term "pyorrhea," as ordinarily used, means a "traumatic, septic gingivitis, with or without detachment and infection of the pericemental fibers of a vital tooth." The gingival margin is ordinarily the location of the beginning of pyorrhea. As the result of trauma or irritation the gingiva is swollen and relaxed, allowing penetration of septic matter into the socket. From then on the process is progressive, the gingival and pericemental attachment of the tooth being destroyed. Chronic cases are insidious in their development and are usually accidentally discovered with the X-ray.

In treating pyorrhea the various factors which may induce the condition must be taken into consideration. "Salivary deposits, loss of mesiodistal tooth contact, irritation from imperfect dental work, malocclusion, loss of opposing teeth for occlusion, thickened alveolar process with impoverished blood supply, dead teeth, tonsil and upper-air passage infections, systemic cacliexia, these all influence the method of treatment." The use of intravenous or hypodermic injections of drugs or vaccines is not rational treatment.

The treatment of pyorrhea is the prompt removal of the cause of inflammation, temporary immobilization of the teeth affected, and stimulation by long, hot normal salt irrigations. "Reattachment of pericemental fibers and cemental formation with complete recovery may be expected." Where there has been much destruction of peri-cementum and deep infection the treatment consists of removing the tooth and other infected structures.

"Dead" teeth and teeth hopelessly affected by pyorrhea should be removed. The usual method of removing teeth by extraction has the following objections:

1. Common occurrence of fractures of the alveolar process or of the tooth itself.
2. Incomplete curettement because of the difficulty of working in the socket.
3. Retention of broken-down alveolar process and granulations due to incomplete surgery resulting in systemic toxemias.
4. The probability of failing to discover complications such as antral perforations.
5. Extensive loss of alveolar process due to a chronic, low-grade suppuration resulting from incomplete removal of necrotic structure.

Infected teeth and alveolar process should be removed by a surgical dissection. A triangular flap, with the apex at the gingival margin of the affected tooth, is raised and pulled back, exposing the outer plate of bone for a little more than the length of the root. The outer plate of the bone is removed with a chisel, exposing the cancellous bone with the root in position. The tooth and alveolar septum are removed with the chisel, leaving the inner plate of the jaw intact. This inner plate is occasionally cut away enough in the upper jaw, when the antrum is involved, to allow the inner flap of mucous membrane and periosteum to be pulled over to meet the outer and immediately sutured, when the operation is completed and the wound closed. Ordinarily it is better not to injure the inner plate, as bone regeneration appears to take place not so readily in the inner as in the outer plate when both plates are removed simultaneously.

The author's wholesale condemnation of pulpless teeth, whether their toxicity is proved or not, should be taken with some degree of conservatism.

(R. B.)

HYGIENE AND SANITATION.

FOREMAN, F. W., and GRAHAM-SMITH, G. S. **Investigations on the prevention of nuisances arising from flies and putrefactions.** Jour. Hyg., London, October, 1917.

The authors have conducted extensive experiments and investigations with the purpose of discovering easy and practicable means for mitigating the various nuisances arising from exposed animal matter and the results of their observations should be of great practical value to those likely to encounter such conditions in public health practice or in actual warfare.

In the first series of investigations it was found that attacks on the adult fly are not likely to produce appreciable effects on the numbers in succeeding generations. In order to diminish the fly nuisance, the eggs and larvæ should be destroyed in the breeding places, where they are confined as in traps. Adult flies may be killed by poisons absorbed from the alimentary canal. Aniline appears to be the most effective of these poisons, using a saturated aqueous solution plus an equal volume of sirup. They may also be killed by poisons absorbed as vapors through the respiratory tract, such as pyridine, crude naptha, and coal-tar oils.

The eggs of species likely to be dangerous to man by conveying infected material to his food, are laid on (*a*) exposed animal matter, (*b*) manure, or (*c*) refuse.

The eggs and maggots in these situations may be considered to represent large numbers of flies in traps.

For killing eggs and larvæ in their breeding places the authors found coal-tar oils, especially creosote oil, to be the most satisfactory reagents. Aniline emulsions are useful, but have little effect on putrefactive processes and the nuisances due to them.

Flies may be repelled from substances which attract them, such as decaying bodies, fecal material, and refuse, and also kept out of habitations by means of the repellant constituents of coal-tar preparations. Flies sprayed with these oils are killed.

For preventing the development of maggots in manure, the fresh manure should be sprayed "incrementally" each day at the rate of 1 gallon of creosote oil to the ton of manure. The smell which attracts the flies is diminished, most of the eggs already deposited are killed, and a large proportion of the maggots which do hatch die.

The creosote oil may be used to excellent advantage as a deodorant. It has been found of great use in removing the smell from putrefying tissues in both animal and human bodies.

It may be used in the form of a spray for destroying eggs and maggots working superficially, for deodorizing putrescent material, for repelling flies from habitations, putrefying substances, fecal matter, latrines and dustbins and for treating infected soil or fresh manure containing fly eggs.

In carcasses, true putrefaction or disintegration is preceded by: (*a*) Early gas formation, mainly due to the action of the intestinal organisms on the carbohydrates of the intestinal contents and tissues; (*b*) exudation of fluid, probably due to the effects of cytolysis and enzyme action; and, (*c*) green discoloration of the skin which appears to be connected with the effect of hydrogen-sulphide or organic acids on the blood pigments. By suitable treatment the tissues may be rendered sterile, when neither gas or green discoloration will be produced, though fluid exudes.

By true putrefaction in carcasses is meant the breaking down of the tissue constituents, accompanied by the elimination of foul-smelling products. The process is due to the activity of putrefactive bacteria assisted by the action of the tissue enzymes.

The putrefactive powers of various species of bacteria can be measured definitely by incubating an amino-acid mixture containing the organisms under standard conditions for a suitable time and determining the ratio of bases to amino-acids.

By similar means the relative powers of different disinfectants to inhibit the action of putrefactive organisms on carcasses can be compared, using for analysis the fluids which exude or tissues from comparable situations.

The proteolytic enzymes of autolysis produce small amounts of ammonia. The results of their activity, in the absence of organisms, yield to low ratio of volatile bases to the substances which respond to formyl titration. If putrefactive organisms do not develop in a treated carcass the same low ratio is obtained. The ratio is correspondingly higher the more active the organisms.

The authors believe that putrefactive bacteria mainly gain entrance into the tissues through the skin. The presence of water and a high temperature provide optimum conditions for the progress of putrefactive changes.

The burial of carcasses does not prevent the development of larvæ present in them, or the subsequent emergence of the flies.

For the superficial treatment of carcasses, reagents should be used which will adhere to greasy surfaces, form films, render the skin waterproof and kill the bacteria in it, thus checking putrefaction by preventing the access of water and putrefactive bacteria to the tissues.

Further, the reagent should be capable of eliminating any stenches which may arise, repelling flies, killing the eggs and larvæ, resisting the action of water, and remaining operative in all respects for a long period.

In the authors' experience, the reagent which possesses the required properties to the greatest extent and gives the most satisfactory results in practice, and is sufficiently cheap and easily obtained for use on a large scale, is coal-tar creosote oil.

Creosote oil mixtures may be used to great advantage for a number of purposes, and the following instructions are given by the authors for their use:

A carcass that can not be disposed of immediately should be sprinkled over with a creosote oil mixture by means of a watering can and the fluid distributed in the direction of the hair with a hand brush. The abdominal and thoracic cavities may be opened

and some of the fluid poured into them, although this does not appear to be necessary. The intestines may be punctured and some of the fluid poured in through a funnel. Small quantities should be poured into the mouth, eyes, ears, anus and any wounds there may be. One gallon usually suffices for treating a horse: half a gallon for the external treatment, and the rest for the serous cavities, if they are opened. Two men can treat a horse in 15 minutes, and this treatment will preserve the carcass for weeks.

If the fluid is injected into the carotid artery in addition to the skin treatment, the body is preserved for months.

Putrefying bodies should be sprayed from a distance. The stench will diminish, after which the body can be approached, when it should be treated thoroughly. Other foul smelling materials can be treated in the same way.

Fly larvæ can be destroyed by spraying or sprinkling the fluid over infected materials. All flies touched by the spray will be killed.

Flies should be driven out of shelters or rooms and pieces of cloth sprinkled with creosote oil mixture hung over the place where they enter. This will keep them out for several days.

For disinfecting liquids, use an alcoholic solution of the fluid.

Protective glasses should be worn by men using the spray, and the spray should not be used near an open flame. The flash point of the creosote oil in the "open cup" is 194 F.

(W. A. B.)

BRUCE, J. **Treatment of scabies by sulphur fumigation.** Proc. Roy. Soc. Med., London, May, 1917.

Bruce advocates the treatment of scabies by sulphur fumigation, because it is "rapid, certain, and cheap." The cabinets used for this treatment are similar to those for Turkish baths. They are made of air-tight wood with an opening in the top for the patient's head, with a cubic capacity of 78 feet, and can hold two patients. The vapor is generated from Jeyes's sulphur candles, each candle being sufficient for the treatment of 10 patients. To encourage sweating, steam is introduced by a portable disinfector. The temperature should be from 100 to 106 F.

The patient is first given a warm bath and thoroughly scrubbed with soap. He then sits in the cabinet, with his head emerging from the opening in the roof. An orderly is in constant attendance and the patient stays in the sulphur vapor 40 or 50 minutes. A longer exposure is apt to produce dermatitis. Clothes and bedding may be fumigated in the cabinet at the same time. Relief is immediate, and encouraging reports of the treatment have been received from France.

As many as 20 men have been treated in one cabinet in one day and returned to their units cured the same day.

Various objections to Bruce's statements are made by other members, who prefer the more commonly used method of warm baths and inunctions with sulphur ointment for three days. They say that the old-fashioned treatment is more certain than the new one, as it absolutely destroys the parasites and their ova, while the vapor gives only a superficial disinfection, and the patient not only is returned for cure but may become a carrier. The prevalence of dermatitis is also mentioned.

To combat these objections, Bruce states that in a period of 18 months in the field only 2 per cent of 200 cases returned, and in that time no ointments for the treatment of scabies were given to the men.

(R. W. McD.)

OSBORNE, T. B., and MENDEL, L. B. **The use of soy bean as food.** Jour. Biol. Chem., December, 1917.

The international shortage of food has created a demand for cheaply produced and easily obtainable sources of nutrients and has stimulated the investigation of articles not generally used as foods, but which might be found to have food value, and thus be made available in a dietary which is daily becoming more limited.

With this object in view the authors have turned their attention to the use of the soy bean as a food, and, after extensive investigations and animal experimentation, have arrived at conclusions which are interesting and suggestive.

This leguminous seed, which has long been used as a food by many inhabitants of the Far East, has been employed in this country almost solely as a suitable food for diabetics.

The employment of the soy bean for silage and as a hay crop is well known. Owing to the richness of the bean in oil, the latter is extensively expressed for commercial uses, the press cake thereby becoming available as a fertilizer or latterly as a food product.

Street and Bailey have conducted extensive investigation of the composition of many varieties of soy beans grown in this country, and also of seven commercial soy-bean "flours," prepared from the unpressed beans.

The following table shows the results of their studies:

Range of composition of soy bean products (Street and Bailey).

	Soy-bean meal.	Soy-bean flour.	
	Calculated on water-free basis.	Calculated on water-free basis.	As procured.
	Per cent.	*Per cent.*	*Per cent.*
Protein (Nx6.25)	36. 8–45. 5	43. 3–45. 0	39. 9–45. 7
Fat	14. 1–19. 0	19. 0–22. 4	18. 2–21. 4
Nitrogen-free extract	26. 2–32. 9	23. 5–27. 0	22. 4–25. 8
Fiber	4. 0– 6. 5	2. 0– 5. 7	1. 9– 5. 4
Ash	5. 2– 8. 6	4. 4– 5. 3	4. 1– 5. 1
Water	.....	.....	3. 0– 7. 8

The flours contain more protein and fat and less of all the other ingredients, owing presumably to the bolting to which they are subjected.

Recent studies in nutrition have shown the importance of supplementing our knowledge of the chemical composition of naturally occurring foods by a "physiological" investigation of the availability and suitability of the groups of nutrients which they contain. The nutrient value of natural products can not be based on the chemical analysis alone.

In testing the nutritive possibilities of various soy-bean products, the authors employed white rats in their feeding experiments.

When the question of the suitability of the protein alone was involved the other ingredients of the diet were furnished in the form of "protein-free milk," starch, butter fat, and lard. Experiments in which raw soy-bean meal was used as the source of protein in the diet showed that in the majority of cases the rats made comparatively little growth, despite the addition of the known essential ingredients other than protein. When the meal was mixed with sufficient distilled water to make a thick mush, heated on a steam bath for three hours, and subsequently dried in a current of air at 80°–90°, the resulting product fed as the sole source of protein in an otherwise suitable food, promoted growth at a normal rate. Similar results were obtained when commercial soy-meal cake was used as the source of protein.

The question then arose as to the cause of the variations in the apparent nutritive value of these different preparations. Evidently there is nothing toxic in the raw meal, for none of the rats which ate died. The failure to grow was seemingly associated with a failure eat the meal readily. It is probable that cooking the meal made more palatable, thereby inducing the rats to consume more of the od, with a resulting gain in weight.

A study of the alimentary utilization of the different products was also made to see if this factor would throw any light on the differences between them. Although there is no marked difference between the utilization of the nitrogen of the raw meal and the cooked, still the nitrogen of the commercial soy cake and the cooked meal was better utilized than was the case with the raw and dry-heated meals.

The following table shows the nitrogen utilization of the variously treated meals:

Nitrogen utilization.[1]

	Per cent.
Raw soy bean meal	78.0 (76.1–79.9)
Heated soy bean meal	72.8 (70.8–75.8)
Cooked soy bean meal	82.0 (80.3–84.3)
Commercial soy cake meal	82.2 (81.1–83.6)

Having demonstrated that the proteins of the soy beans are adequate for promoting normal growth, it was important to determine to what extent the soy bean is capable of furnishing the essential vitamines and salts of the diet. On a ration consisting of soy cake meal or of cooked soy bean meal, together with an artificial salt mixture, starch, butter fat, and lard, rats have completed their normal growth, showing that the soy bean contains an adequate amount of the " water-soluble vitamine."

It appears that the soy bean contains also some of the essential fat-soluble vitamine.

The authors have also demonstrated that the soy bean is deficient in its mineral constituents, but when they added to the food 5 per cent of an artificial salt mixture there was an immediate resumption of growth.

The soy bean appears to be the only seed hitherto investigated, with the possible exception of flax and millet which contains both the water-soluble and the fat-soluble unidentified dietary essentials or vitamines. This fact, together with the high physiological value of the protein, lends a unique significance to the use of the soy bean as food. (W. A. B.)

CANTLIE, J. **Baths and bathing: British and tropical methods compared.** Jour. Trop. Med., December 15, 1917.

Writing editorially, Dr. Cantlie informs us that the much-vaunted daily cold tub, which amounts to a fetish among the better educated classes of males in Britain, does not antedate the middle of the nineteenth century. The practice of a daily morning bath was introduced into Great Britain by young men, military and civil, return-

[1] These figures represent the average results for three or four rats taken over a period of three weeks.

ing from the East and West Indies. The practice of immersion in a tub of either hot or cold water is not the bath of the Tropics, however, which is often taken in the open, and consists of emptying a bucket of hot and then of cool water over the person, followed by a rub down with a cloth. Dr. Cantlie considers this the ideal method, one which has stood the test of hundreds, nay, thousands, of years, whereas the cold tubbing of England is an experiment extending over but two generations.

Examination by the writer of a group of extremists in the matter of cold morning tubs elicited the fact that 30 per cent had albumin in the urine as a result of their bathing habits. Though doubtless the albuminuria was temporary, he regards the daily cold immersion as likely to lead in time to ill health in the form of anemia, heart irregularities, and perhaps permanent renal disturbance.

Dr. Cantlie considers an inquiry into the bathing habits of the patient an essential part of a professional examination and reverts feelingly to the warm baths taken, for the sensuous pleasure they afford, by women, who heighten the bliss of prolonged submergence with a novel and a cigarette.

The Japanese bath is recognized as differing essentially from that of other non-European nations.[1]

PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.

Clough, M. C. Cultivation of tubercle baccilli from circulating blood in miliary tuberculosis. Bull. Johns Hopkins Hosp., December, 1917.

In a review of the literature it was found that guinea pigs inoculated with blood from tuberculous patients in 1,508 cases gave positive results in 195 cases, or 12.9 per cent. Forty-eight of the cases were miliary tuberculosis, of which 32, or 66.6 per cent, gave positive results. Only 1 case was noted in which tubercle bacilli were cultivated from the blood.

[1] The Japanese, as is well known, bathe in water at temperatures above 120 F., and remain in for considerable periods. On coming out, a hasty cold affusion is used, and the body is then rubbed vigorously with a small wash cloth, but not with the idea of thorough drying. The Japanese go from the hot tank and the steaming bathhouse into the coldest outdoor weather, lightly clad and barelegged, without catching cold, presumably because the great heat of the bath acts like cold and contracts the superficial vessels, thus preventing chilling of the blood. By driving a large volume of blood into the internal organs, a sense of warmth and distinct stimulation is obtained. In winter the poorer members of the community combat the cold by attending the public bath three or four times a day. European residents in Japan very commonly renounce the cold tub in favor of an approximation to the Japanese practice, and the reviewer can affirm that a Japanese bath will keep one warm for three or four hours in the chilliest house. What an Englishman or an American deems a hot bath is tepid to a Japanese and justly regarded with horror as enervating, relaxing, and disposing to cold. [Ed.]

The writer reports a series of three cases of miliary tuberculosis in which she cultivated tubercle bacilli from the blood. Ten to 15 cubic centimeters of blood were collected from a vein and added to an equal volume of 1½ per cent solution of sodium citrate. Part of the blood was used for inoculating guinea pigs and part added to shallow flasks of 5 per cent glycerin broth, neutral or slightly acid. After a preliminary incubation of about five weeks the contents of the flasks were centrifugalized and the sediment planted on blood-agar slants which were sealed with paraffin and incubated. In order to reduce the period of time required for cultivation a second method was successfully used in two cases, one of which gave positive results on two blood cultures and one from culture of spinal fluid. In one case culture was positive after 25 days and in another after 13 days. It was thought that the one requiring 25 days did so because a large amount of sediment had been placed on the slant and so made the detection of colonies or organisms more difficult. The second method used consisted in collecting 20 cubic centimeters of blood in citrate solution and laking the blood by addition of distilled water. Three-fourths of the sediment obtained after centrifugalizing was planted on blood-agar slants and one-fourth inoculated into a guinea pig. The five positive cases were found in a total of seven cases examined. Smears should be made from the slants before the colonies can be seen. In order to reduce the amount of sediment to be planted on slants the writer suggests the use of antiformin and is now trying that method.

(G. F. C.)

VAN SAUN, A. I. **Wassermann reaction with diabetic sera.** Jour. Med. Research, 1917, xxxvii, No. 2.

This article is of interest to those engaged in serological work from the fact that many observers have made the contention that diabetic sera gave nonspecific reactions with Wassermann antigens. In the performance of over 10,000 Wassermann reactions, 73 sera were obtained from patients with a known history of diabetes. The test used was the sheep-rabbit hemolytic system, with alcoholic extracts of crude beef heart and cholestrinized guinea pig heart as antigens; incubating at 8–10 C. in one series and at 37 C. in another. In only one instance out of the 73 specimens examined was a positive reaction obtained, and in this there was a positive history of syphilis; two sera were weakly positive and in one a history of chancre 26 years previously was obtained, while the other was negative. Nineteen sera were anticomplementary, which is attributed to the high fat content of the serum existing in diabetes, almost all of the sera being chylous and many of them extremely so. With the use of double serum and antigen controls the nonspecific fixations are

checked, as the anticomplementary qualities may be demonstrated in the double controls when false-positives may occur with the single serum controls.

(J. E. H.)

CHEMISTRY AND PHARMACY.

Axelrad, S. A substitute for lanolin and the preparation of cetylic alcohol. Jour. Am. Pharm. Assn., January, 1918.

The question of substitutes for various materials has been one of prime importance during these war times, especially those substances and chemicals used in medicine and pharmacy. A year and a half ago the supply of wool fat was very limited and the price asked was four times more than that under normal conditions. A substitute called "Eucerin" imported from Germany was also scarce and the agency for this product had only 4 ounces left. It was claimed that "Eucerin" was made from the washings obtained in the manufacture of wool fat. The uses of lanolin are many, especially in pharmacy as a vehicle for ointments, in the preparation of bougies, suppositories, cold creams and plasters of various kinds, etc.

This investigation on a wool-fat substitute was undertaken with the idea of making a fatty composition, which would have all of the desirable properties of lanolin, such as body, tenacity, power of absorbing water readily, taking up solutions of various chemicals used in pharmacy, dry powders, etc.

Liebreich claimed that the absorbing power of wool fat was due to the cholesterin ethers it contained. Lifschuetz isolated the cholesterin ethers of Liebreich and proved that they had very little power of absorbing water. He concluded from his experiments that the absorbing power of wool fat was due to the fatty alcohols of iso- and oxycholesterols. He separated from the alkaline washings of partially saponified wool fat two saturated alcohols and one unsaturated alcohol. His experiments further proved that the more purified lanolin was, the lower was its power to absorb water, owing to the fact that during its purification the iso- and oxycholesterols were partly removed.

Unna states that "Eucerin" is a mixture of alcohols of the iso- and oxycholesterin group with petrolatum. He does not, however, give a commercial method for the preparation of these alcohols. The absorbing power of "Eucerin" is due to these alcohols, but Roemer claims that with the employment of cholesterols for ointment bases, hydrocarbons, such as mineral oil, benzol, etc., are essential, for it is due to them in combination that the absorbing property is imparted. Roemer confirms to a certain extent the work of Unna, but he also fails to give a method for the preparation of the alcohols.

Unna states that "Eucerin" has been used in skin preparations in Germany, especially in pure form for ichthyosis. According to the United States Dispensatory, nineteenth edition, page 97, experiments have been carried on in reference to the absorption of wool fat by the skin. Patschkowski and Kaspar claim that the skin readily absorbs lanolin, but Ritter and Pfeiffer in a long series of experiments were unable to verify these results. Grimm recommends cetyl alcohol for skin preparations on account of its absorption by the skin and he further states that he has found it useful in the treatment of prurigo, weeping eczema, and other skin infections.

In view of the fact that Unna and Roemer have written about the cholesterols, which are aliphatic higher alcohols, and Grimm has given a favorable report on the use of cetyl alcohol, the writer came to the conclusion that the use of this alcohol was advantageous in a substitute for wool fat.

A review of the literature failed to show any commercial method for the preparation of cetyl alcohol. There are many references as to its preparation from spermaceti by saponification with caustic potash and shaking the aqueous soap solution with petroleum ether, this being analogous to the extraction of unsaponifiable matter. Spermaceti is essentially the cetylic ester of palmitic acid. Chevreul, in 1818, isolated the alcohol by the above method. Krafft prepared this substance by the reduction of palmitic acid to the aldehyde and heating it with barium formate. He also made the alcohol by heating the palmitic aldehyde with zinc dust and acetic acid and hydrolyzing the acetate formed.

Levene made this alcohol by the reduction of ethyl palmitate with sodium and absolute alcohol. Schorlemmer distilled a dry mixture of barium oxide with sebacic acid. A method given in several textbooks for the preparation of cetyl alcohol was the saponification of spermaceti with an alcoholic potash, evaporating the alcohol, taking up the residue with water, adding calcium chloride solution to form calcium soap and extracting with suitable solvents. The above methods are useful for preparing small quantities of cetyl alcohol, but for commercial quantities these methods fall down for obvious reasons.

The method of Schorlemmer was found impracticable on account of sebacic acid not being a commercial substance. The extraction process causes a considerable loss of the solvent employed and formation of troublesome emulsions.

It has been found that cetyl alcohol distils at about 340–350 C. without decomposition and the writer's method is based upon the distillation of the calcium soap of spermaceti. Various experiments were performed with the following purposes in view: 1. Greatest yield of cetyl alcohol. 2. Cheapest process. 3. Most practical method.

Experiment I.—Spermaceti (20 gm.) was saponified with alcoholic potash, the alcohol evaporated and the residue heated in a distilling flask to 340 C.

Experiment II.—Spermaceti (20 gm.) was saponified with alcoholic potash, the alcohol evaporated and the soap dissolved in water. To the soap solution was added excess of a 10 per cent calcium chloride solution. The calcium soap was separated and dried at 100 C. and finally distilled at 340 C.

Experiment III.—The method employed was the same as in Experiment II, except that the soap solution was saturated with sodium chlorid. The soap was filtered, dried at 100° and distilled. Many minor experiments were performed by Method III, but they did not show results of such value as to warrant their description.

Experiment IV.—Twenty grams of calcium oxide containing about 5 per cent water were added to 15 grams of melted spermaceti. The mixture was heated for about six hours, with occasional stirring. When cooled, the mass assumed a brownish-yellow color. On distilling same, frothing occurred at 100 C., due to the escape of water. When the water had all been driven off the temperature was raised to 340° when the cetyl alcohol distilled as white fumes and on cooling formed oily drops, which became pure white upon solidification, the melting point being 49.5 C. The yield obtained was over 6 grams. This being over 40 per cent of the actual spermaceti taken. The theoretical yield (calculated) was about 45 per cent.

This method gave a larger yield than the other three preceding methods, and, calculating the cost of the alcohol obtained on a 40 per cent basis, was also cheaper in this method. The ideal temperature for the distillation of cetyl alcohol is 330°–350°, as above this temperature a yellow liquid distils, being strongly acid and having a pungent odor; its value commercially will be investigated at a later date.

A copper still, manufactured by Sargent & Co., Chicago, for the distillation of oils, etc., at high temperatures, was found to be of most service. Glass stills are apt to crack, due to the "caking" of the residue which can readily be removed from the copper still, after each distillation.

Mixtures were made having different quantities of base, cetyl alcohol, lanolin, and water. The formula finally selected as being the best suitable for pharmaceutical compounding was the following: 70 parts petrolatum, 20 parts paraffin (melting point about 60 C.), 10 parts cetyl alcohol, 5 parts lanolin (anhydrous), 100 parts water. This preparation stood in the laboratory for 17 months with absolutely no change in appearance or working qualities. The properties of this mixture are the same as wool fat—that is, taking up solutions of salts, powders, etc., etc. The advantage over wool fat is that it

will not become rancid and is considerably cheaper. The reason for using five parts of lanolin in the mixture was to have the "unctuous" property of wool fat. This, however, is a minor physical property.

EYE, EAR, NOSE AND THROAT.

TOBOK, E. **The treatment of the detachment of the retina with special reference to Müller's resection of the sclera.** Arch. Ophth., Vol. XLVI, No. 5.

The treatment of detachment of the retina by present operative procedure is very unsatisfactory. Certain cases are reported where reattachment took place spontaneously, so that treatment would seem to be of still less value. Treatment is mostly symptomatic, because the etiology is still unknown and none of the various theories are universally accepted. In general, from a practical standpoint, the cases can be classified in two groups, one where there is a disproportion between the contents of the eyeball and its coat, and another where this disproportion does not exist. In the former group belong those whose cause lies in the shrinking of the vitreous, as detachment following iridocyclitis, iridochoroiditis, or intra-ocular hemorrhage, and also those cases where the extension of the sclera with or without shrinking of the vitreous is the underlying cause, as in high myopia. In the second group, where there is no disproportion between the contents and the coats of the globe, belong those cases where the detachment is due to a choroidal exudate, hemorrhage, tubercle, tumor or transudate, as, for instance, in Bright's disease or detachment, following a blow on head or eye.

The prognosis, as well as treatment, depends wholly on the cause. The cases belonging to the latter group either heal spontaneously or can be expected to improve with treatment. The group where there is a disproportion between the contents and the coats of the globe is the one whose prognosis is least favorable. The greater proportion of these detachments are due to high myopia. Medicinal treatment is of no avail. Many operative procedures are recommended. Kittel, in 1860, advised paracentesis of the sclera, and it is still the method most in favor with the majority of ophthalmologists. There are various modifications of this procedure. De-Wecker uses the electrocautery. Parinaud and Higgers employ the trephine. Some ophthalmologists try to produce reattachment by producing inflammation between the retina and choroid. Deutschmann described the method of injecting fluid in the vitreous, realizing that to cure myopic detachment we have to endeavor to equalize the disproportion between the contents and the globe. The numerous objections to this method have prevented his having many followers.

L. Müller endeavors to relieve the existing disproportion by excising a piece of the sclera, thereby diminishing the size of the eyeball. According to his theory the detachment in high myopia is due to the stretching of the choroid with atrophy and circulatory disturbances, followed by a transudate. He attributes the beneficial effect of his operation not to diminishing the size of the eyeball, but to relieving the tension of the choroid, thereby improving the blood circulation and removing the cause for a transudate to form between the choroid and the retina.

(G. B. T.)

COHEN, H. B. **The lingual tonsil and its neglect.** Laryngoscope, Vol. XXVII, No. 9.

Anatomically the lingual tonsil is situated antero-posteriorly from the circumvallate papillæ to the epiglottis on the base of the tongue, projecting backward so that when the structure is enlarged it may touch the tip of the epiglottis. On either side the tonsil is in close proximity to the inferior poles of the faucial tonsils. It consists of lymphoid nodules commonly arranged in groups of three. Its arterial supply is from the dorsal lingual branch of the lingual artery. The veins are a part of the plexus draining the tongue. Physiologically being similar in structure, it must be assumed to have a similar function to the faucial tonsil. Varicosities of the dilated veins and hypertrophy of the lymph structures are two conditions most commonly met. The symptoms most often complained of are cough, sensation of foreign body, paresthesia, voice changes, hemorrhage, and respiratory distress. The neurotic element is demonstrated in these cases. The condition is more frequently found in males than females. Treatment in general consists of the removal of irritating substances and abstinence from alcohol and tobacco. Locally, astringents, silver nitrate, menthol, glycerotannin are indicated. After prolonged local treatment with no improvement operative interference should be considered. The galvano-cautery, in cases of varix, and the lingual tonsillotome in those with plain hypertrophy, give the best results.

(G. B. T.)

STAUFFER, N. P. **Tubercular conditions of the ear, nose, and throat.** Pennsylvania Med. Jour., Vol. XX, No. 12.

Primary tuberculosis of the ear is rare; secondary tuberculosis of the middle ear is fairly common, is characterized by a painless onset and usually runs its course without any inflammatory phenomena. The discharge is usually thin and fetid. Tuberculosis, as a rule, causes rapid caseation of the glands under the ears, though many cases occur without any glandular involvement.

Tuberculosis of the nose occurs in the cartilaginous septum, as an indented swollen-edged ulcer with a dirty, rough base. In the posterior nares the ulcer is often crater like. In involvement of the pharynx the posterior wall usually shows an infiltrating and caseating follicle.

Tuberculosis of the larynx is usually secondary to that of the lungs. The primary lesion may heal, but the secondary ulcerated area may persist. The prognosis in laryngeal tuberculosis is grave. In the incurable stage injections of 1 per cent cocain solution, or 85 per cent alcohol, into the superior laryngeal area gave great relief. Amputation of the epiglottis, when it is markedly involved and is the cause of dysphagia, is an easy and painless operation if it is previously painted with 20 per cent cocain solution. A biting instrument is preferable to a snare. (G. B. T.)

MILITARY, LEGAL AND INDUSTRIAL.

Camp and Trench Sanitation.

In preventing transmissible diseases among soldiers in camps Huntington (New York Med. Jour., June 17, 1916) describes the general problems involved as (1) the disposal of human excreta; (2) the disposal of other organic, solid and liquid, wastes; (3) the furnishing of a safe water supply; (4) furnishing of an uncontaminated food supply; and (5) the proper drainage of the camp site. That these problems become more complex in actual warfare, especially in trench warfare, is obvious. Likewise new problems arise that have to be dealt with, such as the prevention and extermination of vermin, the disposal of the dead, etc.

To be successful in its aim any hygienic program must be complete in all details, and this involves the through instruction of the individual soldier. As Seaman (Wisconsin Med. Jour., June, 1917) points out personal hygiene for soldiers differs from that of civilians only in the peculiar conditions under which the former live and work. The soldier must be taught to understand the importance of fresh air at all times, that it must not be excluded from his quarters, and that it is necessary to his continued good health. He must be given not only the exercise necessary for his physical development and suitable recreation, but he should know that exercise bears a direct relation to health. Cleanliness of person, clothing, and bedding must become a habit. He must be taught the relation that infected waters bear to disease, and that he must not drink water from an unknown or suspicious supply. He should be taught proper methods of eating and should know the evils of overeating. He should eat none but good food and eat only with clean hands. He

must avoid and destroy all vermin—lice, fleas, ticks, flies, mosquitoes, roaches, rats, etc.

Water supply.—The water supply of a camp should, whenever possible, be arranged for in advance by sinking driven wells and piping the water to the necessary points, restricting the number of faucets as much as possible to prevent waste. In the Canadian military camp No. 2, in Simcoe County, Ontario, the water, according to McCullough (Pub. Health Jour., October, 1916), is pumped from six artesian wells into two 100,000-gallon tanks placed at an elevation of 130 feet above the camp level, thus providing an adequate pressure.

Water purification.—In temporary camps where surface water is used, or where troops are on the march, the problem of the sterilization of water arises. Simplest and most efficacious is boiling, and this is used in all temporary encampments. It has often been found best in Europe to make the water into weak tea, which is a better thirst quencher and more palatable than boiled water. (Saville in Am. Jour. Pub. Health, June, 1917; Abstracts of the two most important European works of the war on sanitation: Lelean's "Sanitation in War"; and Tournade, "La Pratique de L'Hygiène en Campagne.") On the march the British practice is to boil the water in kettles during the night. The water bottles are at once filled with the boiling water and thus sterilized. A second boiling provides enough for the water carts. An apparatus similar to the Forbes-Waterhouse sterilizer in use in the United States Army—a distillation apparatus so arranged that the sterilized water imparts some of the heat to the raw incoming water—has been used by the British but has been found unreliable, since the middle compartment may leak and raw water get into the outgoing stream without detection.

Filtration methods such as are applied in the Darnall apparatus of the United States Army have only a very limited use, and results with them have not been satisfactory. Most useful have been found the *chemical methods of purification.* (Saville; loc. cit.)

Hypochlorite of lime.—To secure adequate sterilization there should be one part of available chlorine to a million of water. A safe amount is 2 grams per 100 gallons.

The use of potassium permanganate alone is unsatisfactory; its effect on other than cholera organisms is too uncertain, and in addition it imparts color and taste.

The best combination of chemicals has been alum for clarification and hypochlorite for subsequent sterilization. A heaping teaspoonful of potash alum and one-third as much sodium bicarbonate suffice for the treatment of 100 gallons of water.

Sodium bisulphate provides a most useful means of sterilization of water by the use of a single tablet, and the substance is in considerable use in the British Army. It is especially useful for cavalry and such troops as occasionally find themselves away from their water carts. Each man carries a bottle of the tablets, and when refilling his water bottle he should add a couple of tablets and abstain from drinking for half an hour. Two grams of salt are allowed to the contents of an English water bottle, there being in such a dilution 0.07 per cent of free sulphuric acid, or enough to kill bacteria in half an hour. The tablets are made up with oil of lemon and saccharin, so that the solution tastes like lemonade. The objection to the method is the liability to formation of soluble sulphates of toxic metals from water bottles; aluminum water bottles should be supplied to all men using these tablets, as the amount of aluminum sulphate formed is so slight as to be negligible.

Dakin and Dunham (Brit. Med. Jour., May 26, 1917) describe a tablet of 0.1 gram weight, consisting of 4 per cent sulphondichloraminobenzoic acid, 4 per cent sodium bicarbonate, and 92 per cent sodium chloride for water sterilization. One tablet is sufficient for 1 liter of water. A concentration of 1:300,000 will sterilize an ordinarily heavily contaminated water. The solution has a very slight taste, but is quite potable.

At the meeting of the Association Générale des Hygiénistes et Techniciens Municipaux Gaultier, M. L. (Jour. Am. Med. Assn., July 17, 1915, war letter, Paris), recommended the filtration of water and its sterilization by ultra-violet rays as a method applicable to campaign use.

The sterilization centers comprise (1) a motor engine, (2) a set of rapid filters, and (3) a group of sterilizers. The motor runs a pump capable of delivering a volume of 5 to 20 cubic meters of water to be sterilized per hour, and a continuous current dynamo of 110 volts, capable of furnishing a current to the burner of the ultra-violet-ray sterilizer. According to the size of the station there are two, three, or four sand filters, an artificial sand weighing only 500 kilos per cubic meter being used. The sterilizer is composed of an enameled sheet-iron vat containing two, three, or four quartz mercury vapor lamps. The arrangement is such that the water is subjected to the influence of the lamps three times before passing from the apparatus.

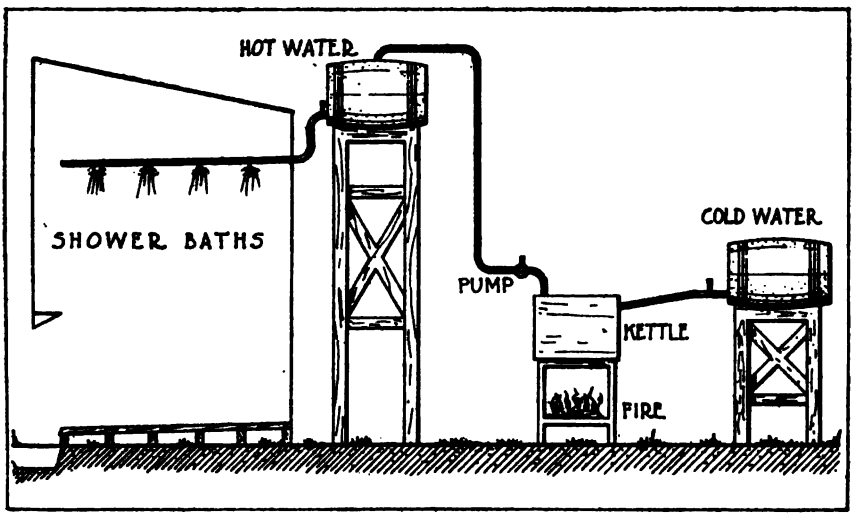
When water is taken from a stream—water for drinking, cooking, watering animals, washing, bathing—it is to be taken in the order named from upstream down.

Bathing facilities, especially shower baths, are most important, and various elaborate arrangements are provided in permanent camps. Saville (loc. cit.) describes a unique arrangement that has

been provided for the vicinity of the trenches and is considerably used. The figure is self-explanatory.

Food supply.—Cook tents and mess tents should be screened and wire gauze covers be provided to protect food from flies. Civilians should not be allowed to set up stands for the sale of food or drink within or near camp, as their wares are usually of the poorest quality and their methods the dirtiest. (Huntington, loc. cit.)

Disposal of sewage, refuse, and excreta.—McCullough (loc. cit.) describes the methods used in a large permanent Canadian camp in Simcoe, Ontario. Sewage and other liquid waste are taken care of as follows: Each battalion has 5 per cent of flush closets of the



Field shower bath.

"range" type placed in stucco-covered buildings. There is likewise a full complement of showers for the officers and men, separate latrine and shower buildings being supplied each unit. Drainage is into sewers, deeply laid. The sewers are of 12-inch, 15-inch, and 18-inch tile. Kitchen liquid waste is all passed into similar sewers, each kitchen being supplied with a screened concrete saucer into which garbage liquids are drained. The sewers are in turn connected with a large sedimentation tank where the effluent is chlorinated.

Solid noncombustible waste material, such as tin cans, bottles, wire, etc., are removed some distance from the camp, sprayed with oil, and burned over at intervals.

Remnants of food, paper, etc., are destroyed in a "Reid" incinerator—a metal box about 4 feet in each diameter and lined with fire brick.

(In this same Canadian camp all blankets are sterilized at intervals of two weeks, facilities being provided for doing the blankets of two battalions per day. Blankets are subjected to live steam for 20 minutes and then to dry heat for 5 minutes. No common drinking cups are used. Dishes and kitchen utensils used in common are boiled after using.)

The methods of disposal of refuse now used in the United States Army are described by Phalen. (Am. Jour. Pub. Health, May, 1917.)

For kitchen refuse an incinerator is constructed as follows: A quadrangular excavation 6 feet by 3 feet and preferably as much as 4 feet deep is made in the ground. This is filled loosely with large stones, broken bricks, and other materials which will conserve heat. The dirt taken from the pit is banked along the sides to about the height of a foot and this sloping bank is paved with stones. The ends of the pit are not banked, in order to increase draft. Upon this incinerator a wood fire is kept constantly burning and upon the heated stones is dumped all the refuse from the kitchen. Such an incinerator is furnished for each company. Refuse remaining in the incinerator is dumped at intervals on a refuse dump established at some distance from the camp.

Huntington (loc. cit.) suggests a modification of this incinerator. A circular pit is used, the four quadrants being used on succeeding days to allow for cleaning. He points out that it is essential that the fire should be very hot and the stones thoroughly heated before adding organic material.

Manure disposal.—The collection of manure from the stables should be continuous during the day. If it is not possible to have the manure hauled off to near-by farms, a method of burning it must be used. A dump is marked off and the manure dumped in winnows running across the area, the winnows being made by dumping the manure from the tail of the wagon as it is gradually moved across the dumping area. The windward side of the winnows is then sprinkled with crude oil and set afire.

For disposal of dead animals.—A hole about 15 feet wide by 10 feet long with a depth of 4 feet is sufficient. Wood is piled around and on top of the bodies and a couple of buckets of crude oil poured over them and set afire.

Disposal of human excreta.—A sewerage system is best if possible. Excreta incinerators have been tried but have not proved successful. The deep latrine has been used with good results. Simply stated, this is only a deep pit with a fly-tight box, with proper care given to its maintenance. The pit is usually about 8 feet deep, 18 inches to 2 feet wide, and should be 18 to 20 feet long for a company, and constructed with eight holes. It is essential that the structure be fly-

tight. The holes should be tightly covered, and furnished with a rail, so set that the cover could not remain open when the hole is not occupied. The box must be removed daily for "burning" of the pit. The latrine should not only be inclosed at the sides but it should be well roofed. This adds much to the comfort of the occupants and prevents flooding and caving in of the pit during heavy rains. Nailed to the upper angle of the inside of the box should be a piece of tin, 8 to 12 inches, shaped into a curve and so placed that it will direct urine back, so as to clear the anterior wall of the pit.

As a further protection the inclosure should be well ditched at a distance of a foot from the walls and the roof should extend sufficiently far beyond the walls to deliver rain water into the ditches.

The latrines are burned out daily by turning the box back and throwing a layer of hay or straw into the pit, which is sprinkled with crude oil and set afire. The usual allowance for this purpose is 1 gallon of oil and 14 pounds of hay per day for each latrine. The object in burning out the pit is to produce a charred layer over the excreta to render them unattractive for flies. Probably fly larvae near the surface are also killed. The interior of the pit may be sprayed daily with a suspension of lampblack in coal oil. This can be applied through the hole without removing the box. The method is said to be efficient.

For the disposal of night urine, two galvanized cans, whitewashed to make them more conspicuous, are placed in each company street. The contents of these cans are emptied each morning into the latrine pit and the cans burned out with the aid of a handful of hay and a dash of crude oil.

Montgomery (Mil. Surgeon, February, 1916) reports good results after treatment of deep latrines with a suspension of lampblack in coal oil. Before the trenches are used the top is removed from each box and the bottom and sides of the pit and the inside of the box sprayed with the mixture. The first coat is thoroughly applied. Once each day the spraying is repeated, taking care that all deposits in the trench are thoroughly covered. At the same time the seats and covers are removed, scrubbed, and sunned. According to Montgomery, the common method of burning out the pits has proved inferior to the spraying process, in that the latter is less expensive as well as more efficient. After the spraying a thin coating of kerosene and lampblack is left over the excreta, making them repellent to flies, and at the same time the interior of the trench is so dark that flies will not enter, even when the covers are off. Moreover, burning requires the removal of tents, boxes, etc., and the handling of straw and oil is troublesome and lengthy, whereas the spraying can be done by one man in 10 minutes.

Huntington (loc. cit.) suggests that a trough, thoroughly limed and leading into the pit, be provided for the disposal of urine. The can provided for night urine should be marked by a lantern. Latrines should be on the opposite side of the camp from the kitchens. Toilet paper should be provided in rolls, as when it is in separate sheets it is much more likely to be blown about.

For the use in camps of not more than four days duration is the "straddle" trench latrine. Huntington (loc. cit.) describes it as a pit not over 18 inches wide, 2 to 4 feet deep and about 10 feet long for a company. The men stand with one foot on each side of the trench, in this way avoiding the soiling of the top of the trench, and each man covers his excreta at once with a little earth. When the trench is filled to within 1 foot of the top, it is filled with dirt and marked.

At the front the problem of disposal of excreta has been a difficult and varied one; the solutions of the same have varied with local conditions. According to Saville (Am. Jour. Pub. Health, June, 1917) the French have largely used deep trench latrines, in a short trench behind and parallel to the front trench and connected with the latter by a diagonal connecting trench. The latrine is placed in the most distant part, and when filled that portion of the trench is filled level with the surrounding ground and a latrine pit dug nearer to the entrance of the trench. It is essential that latrine pits connected with trenches be always much deeper than the trench, to prevent flooding of the latter with excrement in case of heavy rains.

In Flanders, because of the frequent flooding, the English have largely discarded the trench pit. They place buckets with suitable lids in bomb-proof dugouts, buckets being removed and the contents buried by the troops leaving the front trenches for rest billets. Fresh troops going to the trenches bring the empty buckets with them.

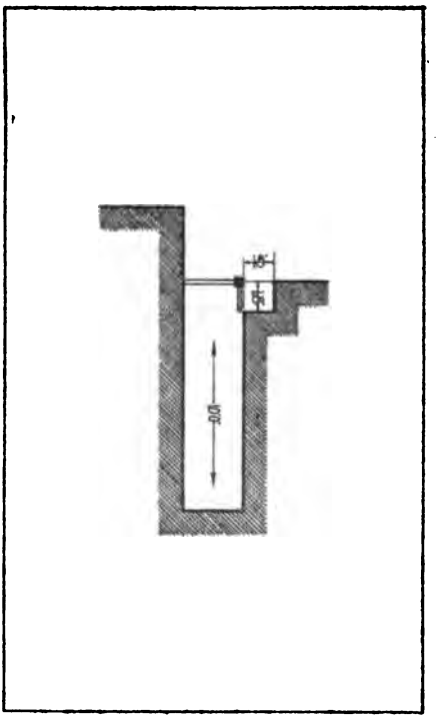
For urine the English now largely use soakage pits. The pit in the shape of a 3-foot cube is excavated and the soil at the bottom loosened. The pit is then filled nearly to the top with graded stones. When a suitable height is reached funnels are inserted in each corner at a convenient height. In this manner fouling of the surface is eliminated and the access of flies to the urine is prevented.

Saville states that "an unofficial method of disposal is said to have consisted in placing excreta in empty tins and tossing them into nearby enemy trenches. Reprisals in kind, however, were so unpleasant that the practice was abandoned by mutual consent."

At Gallipoli, according to Freemantle (Lancet, London, 1916; II, 539), shallow trench latrines were not found appropriate. They covered too much ground and not enough space was available, while the squatting position was torture to the men with diarrhea. The superficial covering of the excreta with earth was not sufficient to

keep out the flies, and maggots soon abounded. Likewise in using shallow trenches the men were constantly polluting their boots in the dark.

The choice lay, therefore, between deep trench latrines and pails. Pails involved much extra labor, the liability of soiling the hands, scattering of paper, exposure to enemy fire of the men emptying them and they were therefore abandoned.



Deep trench latrine modified.

The following modification of the deep trench latrine worked out best. The latrine pole is placed flush with the ground. The user sits level with the ground, his feet in an extra accommodation trench sunk in front of the pole to a depth of 18 inches. The latrine pit itself is 10 feet or more deep, closed on the top and at the front, separating it from the accommodation trench. The advantages are that the soldier has 18 inches more protection. Also there is only one flat plane and a single side to cover in, instead of top, back, front, and two irregular ends of the ordinary deep trench latrine. It is simple in construction and is saving of material. Disinfectants, oil, and lampblack may be used regularly. The advantages over the straddle trench are evident; no flies, paper can not be blown away, etc. When the excreta reach the level of the accommodation trench the whole pit is filled in. (R. A. K.)

HEBBLETHWAITE, A. S. **Treatment of chlorine-gas poisoning.** Jour. Roy. Army Med. Corps, London, December, 1917.

In April, 1916, the author had the opportunity of treating a number of cases of acute poisoning by chlorine gas. They came under his care 14 hours after being gassed. Weather conditions were favorable and the gases were classified as (1) mild; (2) serious.

The routine treatment for mild cases was as follows:

1. Ammonia capsule.
2. Atropine, one-fiftieth of a grain, hypodermically given.

3. Fluid or light diet for 24 hours.
4. Open air in tent during the day.
5. Ammonium carbonate mixture on the second day.
6. Evacuation to base on third day if condition admits.

Serious cases: No routine treatment can be adopted for the severe cases because the nature of one case differs from that of another. The serious cases may be divided into two groups—the "pulmonary" and the "cardiac failures." One form of treatment is not applicable to both.

The pulmonary cases are deeply cyanosed, suffer from dyspnœa and great distress, and their chests are full of râles. After the administration of ammonia and atropine, from 15 to 25 ounces of blood was abstracted by venesection. If the venesection is performed immediately after admission, these cases do well. Oxygen is beneficial if given in concentration through a rubber mouthpiece, gas-bag, and two-way valve. The administration of oxygen by means of a funnel held near the face is wasteful and does little good.

The cases of cardiac failure show pallor instead of cyanosis. The pulse is feeble, the chest is not bubbling with fluid. The cases of cardiac failure may be mistaken by the casual observer for mild cases because there is no marked respiratory distress, but, owing to the likelihood of sudden collapse, they are more serious than those of the cyanotic type. In the cardiac cases venesection does no good, because the heart is not engorged and the resistance in the lungs is not greatly increased. Stimulants are indicated, such as strychnine, digitalin, and pituitrin.

The ammonia capsules seem to stimulate respiration and lessen cyanosis, and the patients ask for them after experience of their effects. The value of the atropine is a matter of doubt. It does not have any appreciable effect upon the amount of fluid in the lungs, but it may lessen bronchial spasm.

Venesection was employed on 42 cases, all of which were serious. Of these, 12 died, and 30 were still living at the time the author prepared his report. Venesection seems to have the following effects:

1. It relieves cyanosis.
2. It relieves pulmonary congestion and makes breathing easier.
3. It relieves the acute headache which supervenes 24 hours after the poisoning.
4. It seems to promote sleep.

Ammonium carbonate and ipecac were administered separately as expectorants. These remedies seemed to do good, but the carbonate of ammonia should not be given until the beginning of the third day, as it proves too irritating.

Morphine was found of service for the relief of pleuritic pain, which begins on the third day. No local applications were at all helpful. Morphine is valuable in carefully selected cases as a means of inducing sleep, but it should not form part of a routine treatment.

In severe cases where reflex cough is abolished, postural treatment is of advantage. If the patient is conscious he should lie on his side with the foot of the bed raised about 12 inches to promote the flow of lung secretion toward the mouth, whence it can be expectorated. If the patient is unconscious, he should be placed on his back with the foot of the bed raised 24 inches. The pulmonary secretion trickles into the throat and should be swabbed out at regular intervals by a hospital attendant.

On the second day a patient's mouth is usually covered with a viscid, foul, green mucous, causing much discomfort. The condition clears up in 24 hours after repeated swabbing with hydrogen peroxide and the use of a mouth wash of glycerine and carbolic acid. Emphysema begins as a rule on the third day and causes agonizing pain. Morphine should be administered after the general condition permits. Surgical emphysema is sometimes present. Lactate of soda was used empirically on 10 patients whose cases were regarded as having about the same degree of severity. The author is unable to report definitely on the value of this medication.

ANDERSON, H. G. **Medical aspects of aeroplane accidents.** J. Roy. Nav. M. Serv., London, January, 1918.

In the early days of flying accidents were common, owing to structural defects in the aeroplanes and to inexperience on the part of the pilots. As the construction of aeroplanes was perfected there was no diminution in the number of accidents because more people entered this field. Since the war methods of teaching have been accelerated and young aviators often perform their first solo flights after only a few hours of dual-control instruction.

The author has classified accidents observed by him under two heads. Those designated "V" series represent accidents at an aeronautic station during a period of six months. The "E" series includes accidents observed during a 15 months' experience at another school.

In the "V" series, during six months, the total flying time was 4,000 hours, there were 9,000 flights, and 58 aeroplanes were wrecked or crashed; that is to say, they were so badly damaged as to require extensive rebuilding. This is in contradistinction to the effects of a bad landing or start where the damage is small and can be repaired

by the flight mechanics. Fifty-eight crashes in 9,000 flights represents 1 in every 155. There were 16 airmen injured, which is equivalent to 28 injuries in every 100 crashes, or 1 pupil injured in every 560 flights. It would, therefore, appear that school flying compares favorably in matter of safety with other high-velocity forms of transit.

Number of solo.	Number of crashes.		
	With injury to pilot.	Without injury to pilot.	Total.
First	1	8	9
Second	5	4	9
Third	1	3	4
Fourth	.....	3	3
Fifth	1	2	3
Sixth	.....	1	1
Seventh	3	5	8
Eighth	.....	1	1
Ninth	.....	2	2
Tenth	.....	1	1
Twelfth	1	1	2
After 10 hours	2	12	14
Dual control	1	.....	1
Total	15	43	58

It would appear that crashes are most frequent in the first and second solos and from the seventh solo on, because the flyer is at first inexperienced, and later overconfident and careless.

Aeroplane accidents are due to (1) defects in the machine; (2) error of judgment in flying; (3) loss of head; (4) brain fatigue; (5) fear; (6) physical illness; (7) unavoidable causes. The following table shows the frequency of these causes:

Cause.	Number of crashes.		
	With injury to pilot.	Without injury to pilot.	Total.
1. Aeroplane defect:			
(*a*) Breakage	1	.....	1
(*b*) Engine failure	.....	.....	.....
2. Error of judgment	4	38	42
3. Loss of head	6	1	7
4. Brain fatigue	3	1	4
5. Fear	.....	.....	.....
6. Physical illness	.....	.....	.....
7. Unavoidable	1	3	4
Total	15	43	58

Defects in the machine.—Defects in the machine are classified as due to: (*a*) breakage; (*b*) failure of engine. Breakage is now rare. In his three years' experience with the Royal Naval Air Service the writer has not seen a machine actually break in the air, but in one case in the "E" series an elevator control wire jammed, causing the aeroplane to nose dive with fatal results to both occupants. Engine failure may be a direct cause of accident, as when the engine fails just as the aeroplane is leaving the ground, there being no favorable landing ground or insufficient height and space to avoid obstacles in front. Engine failure may be a strong contributory cause of accidents. If the engine fails in the air, forced landing is compulsory, but if at a fair height—2,000 feet or more—the pilot can usually select a good field for landing and arrange his descent accordingly, but as he approaches the earth the pilot may find the field not so good as he anticipated when viewing it from a distance, and in such a case there is error of judgment. Such errors are more common with pupils than with experienced aviators. Engine failure just after starting is also apt to be combined with error of judgment when the pilot tries to turn back to his original starting place.

Error of judgment.—Error of judgment is the commonest cause of aeroplane accidents, both in starting from the ground, in the air, and on landing. In the "V" series error of judgment accounted for 42 out of 58 crashes, 38 being on landing. It is difficult to account for these errors of judgment. Sometimes there has been insufficient preliminary instruction. In other cases the pupil misjudges distances in spite of thorough instruction, and it may be found that his vision is below normal. On the other hand the vision may be normal, and likewise balancing power, and the error of judgment may be due to delayed reaction time, especially visual reaction time. Normal vision reaction time is from 0.19 to 0.20 of a second. It may be lengthened by fatigue, drugs and excesses, but again it is sometimes found to be slow in individuals otherwise physically fit. Hence in selecting candidates for aviation the vision and other reaction times must be up to normal standard. French medical authorities on aviation reject candidates whose reaction time is of the delayed type.

Loss of head.—This accounts for seven accidents in the "V" series. In a critical position the pupil has to think, decide, and act quickly. When he loses his head there is no mental inertia, but he makes the wrong decisions. The fraction of a second counts enormously in flying; and if a man loses his head, there is seldom time to correct an error. When a pupil in the air loses his head he may turn the throttle the wrong way, keep his engine full on when he should throttle down, or switch off his engine just when he needs all avail-

able power to make speed. The condition is allied to (1) brain fatigue; (2) fear. The sense of danger may not assert itself, but is ever present in a subconscious way.

Brain fatigue.—When suffering from brain fatigue the pupil has neither the power to reason, decide, or act. He has mental inertia, due to repeated stimuli received in rapid succession. The pupil feels alone. He makes a number of errors in succession. He feels he can not control the machine. He feels helpless, and without actual fear the enormity of the situation appalls him. He awaits the issue of events in a stupor. Questioned after an accident due to this cause, the pupil is usually found to have little recollection of what happened during the flight. Memory as well as initiative has been stunned. It is difficult to determine the type of pupil in whom brain fatigue may be expected. After it has occurred, even if the pupil has escaped injury, he usually gives up flying.

Fear.—This rarely exists in a degree sufficient to disturb flying while actually in the air, whatever sensations may be experienced before and after flight, as the mind is too much concentrated on the details of flying and the various instruments that determine speed, height, revolutions, etc.

Physical illness.—At an air station medical inspection of pilots and pupils should be held at regular intervals to determine the advent of any organic disease that might lead to loss of consciousness in the air. Flying on an empty stomach may cause faintness. Flying begins at dawn in the schools, and all pupils are provided with a good meal of cocoa, tea, bread and butter. On long flights pilots are provided with nourishment in tabloid form. Cold, fatigue, and high altitude may cause faintness or stupor. Two pupils in the "E" series suffered from attacks of malaria in the air and were made to give up flying. Another pupil in the "E" series, though slow to learn, was making fair progress, until one day he made a rather steep descent, did not attempt to flatten out, and when the machine struck the ground at its gliding angle the pilot was thrown out a distance of 66 feet, clearing the machine and escaping with only a sprained ankle. A few days later this pupil was seized with typical epileptic fits. On inquiry a history of epilepsy for five years previously was obtained.

Unavoidable causes.—Some accidents arise from unavoidable causes. In the "V" series four accidents were unavoidable, two of them being due to bad terrain with concealed obstacles and two to collision while in the air.

TYPE OF ACCIDENTS.

Accidents may be roughly classified with reference to period of flight:

Type of accident.	Number of crashes.		
	With injury to pilot.	Without injury to pilot.	Total.
1. In getting off	4	6	10
2. In the air	2	.....	2
3. In landing	9	37	46
Total	15	43	58

DRESSING STATION AT AN AIR SCHOOL.

The sick bay or first-aid station should be in full view of the aerodrome, and during flight hours a man should be constantly on duty there as lookout, supplied with field glasses. If the dressing station is not on the aerodrome, the lookout man should occupy a commanding position from which to view the flying area, and should be connected by telephone with the sick bay. A map of the aerodrome numbered in quadrants for ready reference should be kept at the sick bay. Immediately after reporting an accident the lookout man should proceed to the scene, taking the wheeled hand stretcher, on which is secured a dressing bag and an emergency tool kit, which consists of (1) two crowbars; (2) two strong wire cutters; (3) saw; (4) a long stout knife; (5) a hammer; (6) strong cloth cutting scissors; (7) a fire extinguisher.

An injured aviator should never be dragged out of a wreck except in case of fire. Cut the wreckage away from him. This may prevent a simple fracture from becoming compounded. The hospital attendant, on being notified of an accident, dispatches the ambulance to the scene, carrying two hospital attendants provided with a bag in which are the following articles:

1. Morphine solution and two Wildey's hypodermic syringes.
2. A bottle of chloroform and face mask.
3. Brandy.
4. A bottle of sterilized water.
5. Six first-aid field dressings and slings.
6. Picric-acid dressings.
7. A tourniquet, cloth-cutting scissors, and a knife.

The surgeon on duty at the aerodrome during flight hours proceeds to the spot by car or on foot, but, if the accident has taken place at a distance of a mile or more, it is better to go by aeroplane, as the writer

has done in over 30 cases. He emphasizes the advantages of having the medical attendant arrive quickly and comfortably instead of tired and out of breath. Officers and flight mechanics sent to the scene should be trained in first-aid work with special reference to aeroplane accidents. Flying pupils should not be allowed on the scene except under very exceptional circumstances.

Remove the machine from the patient and conduct a rapid examination to determine the extent of the injuries. If the patient is conscious and in pain, give morphia by hypodermic and convey him to the dressing station for completion of the treatment. If the patient is unconscious, some cutting away of clothing can be done on the field, and perhaps a dislocation can be reduced or fracture set during the unconscious period and before removal. In case of fire, unless the pilot was thrown clear of the machine, the extinguishers must be used, but they are of little value if there is any wind, as an aeroplane on fire is destroyed within a few moments. The pilot's leather clothing protects the body for a time, but the face and lower limbs rarely escape injury. As the pain from burns and other aeroplane accidents is usually severe, chloroform may be given on the field and on the way to the dressing station.

CLASSIFICATION OF INJURIES.

1. Injuries due to crushing, where some part of the pilot's body gets crushed between parts of the wrecked aeroplane. Crushing injuries are very severe in nature and mostly fatal in the propeller type of aeroplane.

2. Injuries due to collision with the ground, as when the pilot is thrown out or hits the ground with his head in turning over in and with the aeroplane.

3. Injuries due to impact with different parts of the aeroplane, as when the head is violently jerked forward and strikes the edge of the nacelle on the aeroplane's impact with the ground. Flying débris, such as broken struts and wires, may cause local impact injuries.

4. Injuries from fire.

5. Drowning and immersion effects in seaplane work.

6. Suspension effects, as when the pilot is suspended head downward in an overturned aeroplane and is unable to loosen his safety belt. In many crashes the sudden impact of the pilot's body on the safety belt causes abdominal injury.

The nature of the injuries is determined in part by the location of the engine, whether in front or behind the pilot. There has been much discussion in regard to the use of safety belts. They are valuable should the pilot faint or be wounded or encounter gusty weather or fog, preventing him from being thrown out into the air or forward against his control lever, and also preventing the feet from being jerked from the rudder bar, and so depriving him of steering power. The value of the safety belt varies somewhat with the type of machine employed. The writer advises releasing the belt near the end of a

glide before landing in the propeller type of aeroplane, but expresses no positive opinion in the case where the tractor machine is used. The ideal saftey belt should be broad and elastic and attached not to the pilot's seat but to the framework of the aeroplane.

Safety helmets are of undoubted value and should be worn by all pupils. They should set properly and not be easily dislodged. They protect from scalp wounds, but have offsetting disadvantages when the manchine turns over, as the crown of the helmet may catch in the ground, wrench the head, and cause fracture dislocation of the neck. An ideal safety helmet should take its support from the shoulders. The writer advocates the use of goggles made of non-splintering material, and there should be no metal in the composition of the nose piece.

Legal enactments against syphilis in fifteenth century. Brit. Med. Jour., December 29, 1917.

Dr. Henri Bouquet has unearthed an interesting historical document (Paris Médical, Sept. 29, 1917)—a decree of the Paris Parlement of March 16, 1496, relative to the prevention of the "great pox." It is interesting to note that the date of this decree is only four years later than the discovery of the New World by Christopher Columbus and the supposed importation of the scourge into Europe. It sets forth that for two years the disease had raged in Paris and other places in France, wherefore the reverend father in God, the Bishop of Paris, in association with certain royal officials, was commissioned to devise measures for checking the scourge. A proclamation was to be made by the public crier in the King's name that all men and women suffering from the disease who were not residents of Paris when attacked should, within 24 hours, go forth from the city to their native place or elsewhere, as they thought fit, under penalty of the hangman's rope. To facilitate their departure all such persons were to be given four *sols parisis* as they passed out by the gate of St. Denys or St. Jacques, with a strict injunction not to return till they were completely cured. Paris residents were to be confined to their houses and forbidden to go about the city under a like penalty; if they were indigent, they could on the recommendation of their parish priests or churchwardens be supplied with suitable provisions. Such poor persons as had no home to go to were to be isolated in houses hired for the purpose in St.-Germain des Préz, and were to be supplied with food and other necessaries, but were forbidden to go into the city till their cure was complete. Women were sheltered in separate quarters. When accommodation in these houses was inadequate, the patients were placed in barns and other buildings hired at the expense of the city. The patients were not allowed to hold any communication with people outside;

breach of this regulation was punished by imprisonment and corporal punishment. This ordinance could not have been very effective for on June 25, 1498, the prohibitions were reissued under the penalty of being cast into the river. This appears to be the first attempt to found special establishments for the segregation of syphilitics. It thus marks a date in the social history of venereal disease, but it may also be taken as a record of the first failure of legislative repression.

Chicago City Council's ordinance for control of venereal diseases. Bull. Soc. Hyg., New York, October, 1917.

An important ordinance relating to the control of venereal diseases was passed by the city council of Chicago, June 29, 1917.

The ordinance (*a*) declares syphilis, gonorrhea, and chancroid to be contagious, infectious, communicable, and dangerous to the public health.

(*b*) Requires physicians, managers of hospitals and dispensaries, and all other persons who give treatment for venereal diseases to mail, within three days of the first visit of the patient, to the department of health a card stating the age, sex, color, marital condition, and occupation of the diseased persons, nature, and previous duration of the disease, and the probable origin.

(*c*) Requires physicians to hand to patients afflicted with venereal disease, at the first examination, a circular of information and advice furnished by the department of health and also a copy of this ordinance.

(*d*) Requires the physician to ascertain from the patient whether a physician has been consulted heretofore, and, if so, to immediately inform the physician or person who previously treated the patient. Should the physician or person previously consulted fail to receive such notice within 10 days after the last appearance of such venereally diseased person, it shall be the duty of such physician to report to the health department the name and address of the patient.

(*e*) Requires the commissioner of health to institute such measures for the protection of others against venereally diseased persons as he is already empowered to use to prevent the spread of other contagious, infectious, or communicable diseases.

(*f*) Provides that all reports shall be confidential and inaccessible to the public.

(*g*) Holds parents of minors, having venereal disease and living with their parents, responsible for the compliance of such minors with the requirements of the ordinance.

(*h*) Imposes a fine of not less than $25 nor more than $100 for each offense on persons who violate, neglect, or refuse to comply with these provisions.

BOAS, F. **The relation between civilization and stature.** J. Sociol. Med., Easton, Pa., December, 1917.

By civilization in this connection is understood the complexus of artificial conditions differentiating the life of man from that of the lower animals. These conditions are based on artificial preparation of food and the protection offered by clothing and shelter. The most primitive man of modern times must be considered a self-domesticated animal. All the conditions of nutrition and of shelter that are found among domesticated animals are characteristic of human life. Parallelisms between modifications in structure of skeleton of civilized man and modifications in domesticated animals have to be studied. Modifications of stature in man are to be viewed as incident to domestication. On the other hand, stature is a matter of heredity influenced by environment. Recent observations in various countries of Europe show that in the past 50 years stature has increased in every one of them. Reliable statistics obtained from Denmark demonstrate an average increase of 5 c. m. in stature.

Observations of school children in Boston for every European type show that the stature of the children of the well-to-do is in excess of that of poorer classes. This has been found true of Jewish children of London. The changes are dependent on retardation or acceleration of development. Retarded physiological maturity and low stature go hand in hand. The same is true of dentition. In children whose development is retarded in early years the retardation will probably continue. A long standing retardation can never be made up.

In retardation of growth in children, malnutrition plays an important rôle. Chronic diseases have also to be considered. As these are reduced in frequency of occurrence, many cases of retardation will disappear.

A new problem is presented by recent observations of Harvey Cushing relative to effect of internal secretions on growth.

Heredity at least for a few generations is an indisputable and marked factor.

To arrive at valuable conclusions, inquiries relative to health and nutrition of the individual and observations on stature of families are indicated. Crude observations on a large mass of individuals will not be sufficient, and statistics of the present conscription will not materially reward the student of this problem, but an intensive study of the physiology of growth might be of huge value.

WYNNE, S. W. **Longevity.** J. Sociol. Med., Easton, Pa., December, 1917.

Longevity from the viewpoint of a man or woman of middle age is usually interpreted as living to a ripe old age. But, from the view-

point of the child, longevity has a relatively different meaning and to those interested in public health this latter interpretation has appealed more strongly than the former, with the consequence that during the past decade a multitude and variety of child-welfare organizations have sprung into being. It is both proper and logical that efforts should have been focused upon the child. First, because the greatest numerical and potential waste of life was occurring during infancy and early childhood. Second, because laboratory and clinical studies had proved that the diseases of childhood were conquerable by modern sanitation and preventive medicine. Third, since a beginning had to be made the beginning of life was the logical place to commence the attack against the forces of death. On the other hand, man's greatest yearly value to the community should be during his middle lifetime, when he should be still comparatively active and when his knowledge has been ripened by experience. Therefore, efforts should not be confined to making safe only the first span of life.

Unfortunately, life tables for all communities are not available and do not extend over a sufficient period of time to permit accurate measure of the results that have been obtained in the conservation of life.

In England and Wales, during the period 1838 to 1854, the expectation of life at birth was about 40 years. Between 1910 and 1911 it was 51½ years, a gain of 11½ years. At the age of 5, in 1838, the expectation of life was 49.71 and in 1910 it was 57.14, a gain of 7½ years. At 25 years the expectation of life in 1838 was 36 years against 40 years in 1910. At 50 the expectation of life in 1838 was 19.54 as compared with 20.29 in 1910. At 70 the expectation of life in 1838 was 8.45 as against 8.53 in 1910. It is evident, then, that in England and Wales the span of life has been extended. This extension, however, has been greatest in the early stages of life, being 11 years greater at birth, only 4 years greater at the 25th year, and at 50 only 1 year; at 70 only 1 month greater.

TABLE No. 1.—*Comparison of the expectation of life of males at certain ages in England and Wales, according to the life tables based on the mortality of 1838–1854 and 1910–1912.*

Age.	1838-1854	1910-1912	Gain.
0	39.91	51.50	11.59
5	49.71	57.14	7.43
10	47.05	53.08	6.03
15	43.18	48.57	5.39
25	36.12	40.00	3.88
35	29.40	31.71	2.31
45	22.76	23.92	1.16
55	16.45	16.89	0.44
65	10.82	10.99	0.17
75	6.49	6.49	.....

It is interesting to note that the expectation of life at 75 was exactly the same in the period 1910–1912 as in the period 1838–1854. It is only fair to state that these tables, computed as they were, many years apart, are not truly comparable because different methods were used in their construction. However, the difference in the methods used exerted but little effect upon results for the middle years of life, the only inaccuracies because of method being encountered at the extremes of life.

TABLE No. II.

Age.	Males.			Females.		
	Life table No. 6.	Life table No. 7.	Life table No. 8.	Life table No. 6.	Life table No. 7.	Life table No. 8.
5	2,132	1,656	1,678	2,155	1,730	1,656
10	1,215	1,006	956	1,279	1,063	985
15	1,864	1,533	1,392	1,794	1,431	1,320
20	2,492	2,058	1,857	2,227	1,732	1,554
25	2,947	2,422	2,116	2,781	2,083	1,814
30	3,772	3,119	2,629	3,255	2,651	2,243
35	4,948	3,978	3,430	4,217	3,337	2,844
40	6,332	5,082	4,483	5,221	4,135	3,608
45	7,904	6,737	6,026	6,190	5,291	4,707
50	10,443	9,128	8,272	8,226	7,048	6,393
55	13,732	12,622	11,696	11,082	10,007	9,023
60	19,007	17,419	16,478	15,950	13,740	12,739
65	25,616	23,882	23,188	22,229	19,416	18,560
70	35,728	33,929	32,922	31,887	29,824	27,819
75	47,238	46,302	45,625	43,016	41,160	39,892
80	64,121	59,006	59,342	59,768	54,364	53,976
85	78,546	74,321	72,553	73 530	69,579	66,794
90	89,512	86,624	82,602	84,845	81,801	78,944

In the seventy-fifth report of the registrar general there is a table showing the number who died in five years out of 100,000 at each age according to the English life tables Nos. 6, 7, and 8, respectively. The following is quoted from the analysis of this table:

Throughout the whole life after the age of 5, life table No. 7, based on the deaths of the years 1901 to 1910, shows lighter mortality both for males and females than does life table No. 6, based upon the deaths of 1891 to 1900. Again, life table No. 8, which is of the most recent date, based upon the deaths of the three years 1910, 1911, and 1912, shows a decided improvement over No. 7. In both the tables Nos. 7 and 8 the year 1910 is included. No. 7 may be taken to show an average in mortality of the years 1905 and 1906, and No. 8 covers the year 1911, so from that point of view No. 8 is about five or six years later date than No. 7.

The following table is also given in the same report and shows the number of deaths that would take place in one year in a population represented by the actual census enumerations of 1911 according to

the rates of mortality shown by the English life tables Nos. 6, 7, and 8, respectively. At every age, as before, these tables show a reduction in the mortality according to their chronologic order. For males, age from 5 to 89 last birthday, there would be 217,199 deaths annually according to life table No. 6; 189,109 according to life table No. 7; and 175,844 according to life table No. 8. Thus annually there are 41,355 male lives saved in England and Wales by the decrease in the rate of mortality which took place between the period of 1891 to 1900 and the period 1910 to 1912. Similarly there are 48,562 female lives saved. The improvement in the rate of mortality of males has been 19 per cent; of females almost 22 per cent.

TABLE No. III.

Ages last birthday.	Males.			Females.		
	Life table No. 6.	Life table No. 7.	Life table No. 8.	Life table No. 6.	Life table No. 7.	Life table No. 8.
5–9	8,877	6,196	6,271	8,956	6,482	6,193
10–14	4,301	3,532	3,357	4,528	3,738	3,469
15–19	6,210	5,104	4,638	6,097	4,842	4,471
20–24	7,578	6,243	5,631	7,537	5,852	5,240
25–29	8,705	7,136	6,223	9,156	6,825	5,938
30–34	10,544	8,690	7,307	9,907	8,041	6,785
35–39	12,768	10,217	8,785	11,621	9,155	7,785
40–44	13,974	11,131	9,787	12,360	9,723	8,453
45–49	15,211	12,872	11,471	12,751	10,841	9,614
50–54	16,805	14,570	13,134	14,223	12,101	10,934
55–59	17,857	16,304	15,024	15,670	14,067	12,615
60–64	19,885	18,055	16,972	18,662	15,892	14,638
65–69	21,515	19,836	19,174	22,019	18,892	17,965
70–74	20,582	19,255	18,549	23,980	22,066	20,321
75–79	15,838	15,461	15,112	19,973	18,905	18,069
80–84	11,138	9,747	9,850	15,478	13,379	13,268
85–89	5,411	4,760	4,559	8,232	7,338	6,830
Total, 5–89	217,199	189,109	175,844	221,150	188,139	172,588

It is evident, therefore, from these tables that there has been a saving of life in England and Wales at every age period from the fifth to the eighty-ninth year, and the tables printed in the seventy-fifth report of the registrar general show that there has been an increase in the expectation of life at every age up to the one hundred and fifth year, inclusive.

The German life tables show an increase in the expectation of life at every period of life from birth to the one hundredth year. At birth the gain is a little over nine years; at the fifth year the gain is five years; at the twenty-fifth year of life the gain is four years; at the fiftieth year the gain is almost two years; and at the seventieth year of life about four months.

TABLE No. IV.—*Comparison of the expectation of life for males at certain ages, according to the German life tables.*

Age.	1871-72 to 1880-1.	1901 to 1910.	Gain.
0	35.50	44.82	9.32
5	49.39	55.15	5.76
10	46.51	51.16	4.65
15	42.38	46.71	4.33
25	34.96	38.59	3.53
35	27.88	30.53	2.65
45	21.16	22.94	1.78
55	14.96	16.16	1.20
65	9.55	10.40	.85
75	5.51	5.97	.46

Unfortunately, the United States has no life tables for the entire population for an extended period of time that would permit of a comparison of the mortality and expectation of life to-day with bygone years.

However, some idea of the conservation of life in this country may be gained by comparing the expectation of life, as revealed by the life tables for the city of New York, constructed under the direction of Dr. John S. Billings, sr., and based upon the mortality of the triennium 1879 to 1881, with the life table recently constructed for the city of New York by Dr. Williams, under the direction of Dr. Guilfoy. The comparison of these tables shows that the expectation of life of a child under 5 years of age was 41 years, according to Dr. Billings's table, and 52 years according to the more recent table. This increase in the expectancy of life, however, diminishes rapidly until the fortieth year, when the expectancy of life becomes shorter, according to the recent table, than it was in 1880.

TABLE No. V.—*Approximate life tables for the city of New York, based on the mortality returns for the triennia 1879 to 1881, and 1909 to 1911.—Expectation of life for males.*

Ages.	1879-1881	1909-1911	Gain.[1]
5	49.7	50.1	+10.4
5 to 9	44.9	49.4	+ 4.5
10 to 14	42.4	45.2	+ 2.8
15 to 19	38.2	40.8	+ 2.6
25 to 29	31.2	32.7	+ 1.5
35 to 39	25.3	25.4	+ .1
45 to 49	19.8	18.9	− .9
55 to 59	14.5	13.2	− 1.3
65 to 69	9.9	8.8	− 1.1
75 to 79	7.1	5.3	− 1.8

[1] Increase +; decrease −.

The reason for this increase in mortality and decrease in the expectation of life in the later age groups has been in dispute for some time. It has been held by many that the increased mortality has been due to the more strenuous life led by the people of to-day as compared with those of a generation ago, and that it has been confined almost entirely to the so-called degenerative diseases. A table constructed several years ago by Dr. Guilfoy showed this supposition to be fallacious, and Dr. Dublin has recently published a paper in which he points out that the increase in the mortality of the degenerative diseases is apparent and not real and is due to more exact statements of causes of death by attending physicians, as well as to increased accuracy in diagnosis. He also shows that the introduction into our population of large numbers of persons of foreign race stocks, whose mortality at the later years is higher than the mortality of the natives at the same ages has been responsible for the decrease in the expectation of life after 40 years of age.

As a result of the evidence thus examined, it may be concluded that civilization has increased longevity, not only from the viewpoint of the child but also from the viewpoint of the adult man and woman, and it would seem that this increase in longevity from the viewpoint of the adult will be further advanced within the next decade or two for the following reasons: First, the incidence and mortality of the acute infectious diseases have been reduced, and since every disease that a person passes through weakens the vitality and the resistance of the individual, it is reasonable to suppose that with the reduction in the incidence of these diseases there will in later years be a corresponding reduction in the diseases that these acute infections predispose to as the children of to-day who have escaped the scars of battle with these diseases reach the later stages of life's journey. Secondly, within recent years attention has been more accurately focused upon the mortality of advanced life. Such men as Metchnikoff have pointed out that the natural life of man should be extended to 100 years and within the past year or two organizations have sprung into being which have for their object the reduction of the mortality of the degenerative diseases.

PRINCIPAL CAUSES OF DEATH DERIVED FROM CENSUS BUREAU'S SUMMARY OF MORTALITY STATISTICS FOR 1916.

The "registration area," which contained approximately 70 per cent of the population of the entire United States, reported for that year 1,001,921 deaths. Of these deaths, nearly one-third were due to three causes—heart diseases, tuberculosis, and pneumonia—and nearly another third were charged to the following nine causes: Bright's

disease and nephritis, cancer, apoplexy, diarrhea and enteritis, influenza, arterial diseases, diabetes, diphtheria, and typhoid fever.

The deaths from heart diseases (organic diseases of the heart and endocarditis) in the registration area in 1916 numbered 114,171, or 159.4 per 100,000 population. The death rate from this cause shows a marked increase as compared with 1900 (the earliest year for which the annual mortality statistics were published), when it was only 123.1 per 100,000. The increase has not been continuous, however, the rate having fluctuated from year to year.

Tuberculosis in its various forms caused 101,396 deaths in 1916, of which 88,666 were due to tuberculosis of the lungs. Because of progress in the prevention and treatment of tuberculosis of all kinds, the decline in the tuberculosis death rate in recent years has been most pronounced, having fallen from 200.7 per 100,000 in 1904 to 141.6 in 1916, a decrease of nearly 30 per cent. Before 1904 the rate had fluctuated, starting at 201.9 in 1900. Even yet, however, tuberculosis causes more deaths annually than any other malady, except heart diseases, and about 37 per cent more than all external causes—accidents, homicides, and suicides—combined.

Pneumonia (including broncho-pneumonia) was responsible for 98,334 deaths in the registration area in 1916, or 137.3 per 100,000. This rate, although lower than that for any year from 1900 to 1910, inclusive, with the single exception of 1908, is higher than that for any of the years from 1911 to 1915, inclusive. The lowest recorded rate for all forms of pneumonia was 127 per 100,000 in 1914. The mortality from this disease, like that from tuberculosis, has shown a marked decline since 1900, when it was 180.5 per 100,000. Its fluctuations from year to year, however, have been pronounced, whereas the decline in the rate for tuberculosis has been nearly continuous.

The only remaining death rate higher than 100 per 100,000 in 1916 was that for Bright's disease and acute nephritis, 105.2. The total number of deaths due to these maladies in 1916 was 75,316; of this number, 69,395 were caused by Bright's disease and 5,921 by acute nephritis. The mortality rate from these two causes has increased from 89 per 100,000 in 1900, with some fluctuations from year to year.

Cancer and other malignant tumors caused 58,600 deaths in 1916. Of these, 22,480, or nearly 39 per cent, resulted from cancers of the stomach and liver. The death rate from cancer has risen from 63 per 100,000 in 1900 to 81.8 in 1916. The increase has been almost continuous, there having been but two years, 1906 and 1911, which showed a decline as compared with the year immediately preceding. It is possible that at least a part of this increase is due to more correct diagnoses and to greater care on the part of physicians in making reports to registration officials.

Apoplexy was the cause of 58,233 deaths, or 81.3 per 100,000. The rate from this disease increased gradually, with occasional slight declines, from 1900 to 1912, and since 1913 the increase has been continuous.

Diarrhea and enteritis caused 56,763 deaths in 1916, or 79.3 per 100,000. The rate from these diseases has fallen somewhat in recent years, having been 90.2 in 1913, and is very much lower than the corresponding rate for 1900, which was 133.2. Nearly five-sixths of the total number of deaths charged to these causes in 1916 were of infants under 2 years of age.

Influenza was responsible for no fewer than 18,886 deaths in the registration area in 1916, or 26.4 per 100,000. The rate from this malady, which fluctuates very considerably from year to year, was higher in 1916 than in any preceding year since and including 1900, with the single exception of 1901, when it stood at 32.2.

Arterial diseases of various kinds—atheroma, aneurism, etc.—were the cause of 17,115 deaths in 1916, or 23.9 per 100,000. This rate, although somewhat lower than the corresponding ones for 1912 and 1913, is higher than those for 1914 and 1915. The rate for these causes increased continuously from 6.1 in 1900 to 25.6 in 1912.

Deaths from diabetes numbered 12,199, or 17 per 100,000. The rate from this disease has risen almost continuously from year to year since 1900, when it was 9.7.

No epidemic disease, with the exception of influenza, produced a death rate as high as even 15 per 100,000 in 1916. The fatal cases of diphtheria and croup—which are classed together in the statistics, but practically all of which are cases of diphtheria—numbered 10,367, or 14.5 per 100,000 population. The rate for diphtheria and croup in 1900 was 43.3, and the decline of nearly 67 per cent from that year to 1916 is relatively greater than that shown by any other important cause of death. The rate fluctuated somewhat from 1900 to 1913, but has fallen continuously since the latter year.

The mortality rate from typhoid fever has shown a most remarkable and highly gratifying decline since 1900, having dropped from 35.9 per 100,000 in that year to 13.3 in 1916. The proportional decrease in the rate, amounting to 63 per cent, is a close second to that shown for diphtheria and croup. The efficacy of the antityphoid vaccine and of the many improvements in methods of sanitation has been demonstrated in a striking manner by this great reduction in the typhoid death rate.

MEASLES, WHOOPING COUGH, AND SCARLET FEVER.

The principal epidemic maladies of childhood—measles, whooping cough, and scarlet fever—were together responsible for 17,586 deaths of both adults and children, or 24.6 per 100,000, in the registration

area in 1916, the rates for the three diseases separately being 11.1, 10.2, and 3.3. As in 1913, measles caused a higher mortality than either of the other diseases, but in 1914 and 1915 whooping cough had first place. In every year since and including 1910, as well as in several preceding years, measles has caused a greater number of deaths than scarlet fever. The rate for scarlet fever in 1916 was the lowest on record, while that for whooping cough, although considerably below the highest recorded rate for that disease, 15.8 in 1903, was far above the lowest, 6.5 in 1904.

ACUTE POLIOMYELITIS.

Acute anterior poliomyelitis, commonly called infantile paralysis, caused 7,130 deaths in 1916, representing a rate of 10 per 100,000 population. This disease developed in epidemic form in that year, and the resultant mortality showed an enormous increase. The rate from infantile paralysis declined from 2.7 per 100,000 in 1910—the first year in which this malady was reported separately as a cause of death—to 1 per 100,000 in 1915, the decrease having been continuous from year to year except for an increase between 1911 and 1912. The rate for 1916, however, was 10 times as great as that for the preceding year.

Of the 26 States in the registration area in 1916, the 5 showing the highest rates reported 75 per cent of all the deaths from this cause. These States, with their rates, were New Jersey, 41; New York, 32.8; Connecticut, 19.2; Massachusetts, 12.5; and Maryland, 8.1. The next highest 5 rates appear for Pennsylvania, 7.8; Rhode Island, 7; New Hampshire, 5.6; Montana, 5.2; and Michigan, 4.9.

ACCIDENTS AND INJURIES.

The deaths resulting from accidents in 1916 numbered 60,071, corresponding to a rate of 83.9 per 100,000 population. This rate is considerably in excess of that for 1915 (76.3). The most marked increases appear for deaths due to railroad and to automobile accidents and for those resulting from the effects of heat.

The rate for deaths from railroad accidents in 1916 (11.3) exceeds the corresponding rates for 1914 and 1915 (10.7 and 9.9, respectively), but, with these exceptions, is the lowest one recorded since 1906, the first year for which deaths from this cause were reported separately.

Deaths from automobile accidents and injuries in 1916 totaled 5,193, or 7.3 per 100,000 population. As might be expected, in view of the enormous increase in the number of automobiles in use, the death rate due to these causes has advanced continuously since 1906—the first year for which they were reported separately—when it stood at 0.4 per 100,000 population.

Deaths resulting from street-car accidents in 1916 numbered 1,775, or 2.5 per 100,000. This rate is the same as that for 1914, but shows an increase as compared with 1915. During the past 10 years, however, there has been a material falling off in the rate for this cause.

Machinery accidents caused 1,624 deaths in 1916, or 2.3 per 100,000 population, this rate being somewhat greater than those for the preceding two years—1.9 for 1915 and 2 for 1914.

The number of deaths from mine accidents and injuries in the registration area in 1916 was 2,119, corresponding to a rate of 3 per 100,000. The deaths from these accidents for the last three years show a material decline as compared with those for the preceding 10 years.

There were 2,056 deaths in 1916 from the effects of heat, the rate being 2.9 per 100,000 population. This is the highest rate shown for this cause in the last 15 years, with the exception of that for 1911, which was 5.3.

SUICIDE.

The number of suicides reported for 1916 was 10,162, or 14.2 per 100,000. This rate is the lowest for the past 10 years.

DEATHS CAUSED BY FIREARMS.

The total number of deaths due to the use of firearms in the registration area in 1916 was 8,240, corresponding to a rate of 11.5 per 100,000. Of these deaths, 3,386 were suicidal, 3,241 were homicidal, and 1,613 were accidental. The suicidal use of firearms shows a decline as compared with 1915 and 1914; their homicidal use decreased as compared with 1914, but increased as compared with 1910, 1911, 1912, and 1915, and the rate was the same as for 1913; and the frequency of accidental deaths due to their use shows a slight decline during recent years.

REPORTS.

SANITARY NOTES FROM A MARINE TRAINING CAMP.[1]

By W. L. MANN, Passed Assistant Surgeon, United States Navy.

Health in general.—The general health of the camp continues satisfactory. Steady progress in the improvement in sanitation of the reservation and municipality is noted. Until recently all sanitary matters were personally supervised by the undersigned, but the great increase of office duties now necessitates the assignment of some of the work to an assistant.

Infectious and contagious diseases.—There have been five cases of mumps, one of chicken pox, and one case of measles in the past month. Six of the above cases were in drafts who had been present on this station only a few days, thus indicating infection prior to their arrival. One case of meningitis, in a civilian laborer, was reported. The building was fumigated, and all men occupying the same quarters were examined for meningococcus carriers; two were detected and isolated. Later a case developed in a member of the Ninth Company, Mobile Artillery Force. Five carriers were detected and isolated. A systematic examination for carriers is now under way.

Method of keeping property of the medical department.—This office requisitions for the medical, surgical, and sanitary supplies for the entire station, with the exception of sick quarters (personnel about 6,000 men). All nonexpendable supplies are issued to each of the four regimental infirmaries upon the memorandum receipt of the senior medical officer, and a duplicate card-index system is kept of the same. The expendable stores are issued weekly, upon the request of the respective senior medical officer, causing this office to act as a central supply depot for medical stores.

The four dispensaries are equipped with quartermaster property, the same being charged to the post surgeon. A card-index record of these articles is kept, similar to that for the nonexpendable medical stores.

In addition, this office acts as pay office for about 100 hospital corpsmen in making out monthly pay accounts and handles the

[1] Extract from monthly sanitary report for November, 1917, Quantico, Va.

clothing accounts, which has proved a very strenuous undertaking, as the decisions regarding the clothing of hospital apprentices serving with marines are complicated and, in some points, conflicting and confusing. A chief pay yeoman is necessary to assist in this undertaking, but the request for one has been disapproved. Practically all Bureau of Medicine and Surgery forms are also made out at the central office.

The above system tends to cause an accumulation of work at this office, but it appears to be the only satisfactory manner of dealing with the situation. The constant going and coming of the various organizations requires careful supervision of all the stores. These organizations realizing that their stay at this post is temporary and indefinite are naturally more or less uninterested in the station proper. Hence all improvements and arrangements have to be initiated by the post detachment.

It is realized that the primary functions of the permanent organization at this post is the preparation of the different organizations for overseas and expeditionary duty, and endeavor has been made to keep this foremost in mind. On the whole, the duty continues interesting and instructive, and cooperation is so satisfactory that it is believed the results obtained have fully repaid the energy expended. Affairs are now much better organized and systematized than at first with consequent reduction of administrative duties.

Post laboratory.—This is under the management of two assistant surgeons, especially instructed for their duty. At present they are working on the detection of meningococcus carriers. This laboratory is essential for satisfactory handling of sanitary problems. Some of the actual or contemplated undertakings of the laboratory are as follows:

(1) Periodic estimation of CO_2 in barracks.

(2) Examination of shallow wells in the vicinity.

(3) Examination of the milk, cold drinks, and ice-cream supply of the station.

(4) Later, the bacteriological examination of the water at the bathing beach.

Suggested devices for improvement in sanitation.—The following comprise some of a series of devices that have occurred to me during my course of duty at this station. It has been impossible, owing to multiplicity of duties, to perfect any one of them:

(A) HILLSIDE INCINERATION.

Use is made of a ravine alongside of a steep embankment. The garbage wagon drives up to the edge of the bluff and dumps the garbarge on piles of brushwood. This acts as a strainer for the solids, permitting the liquid to be collected immediately beneath the

Caldwell incinerator.

Improvised field shower bath, soakage pit and soap trap for waste water.

Bench latrine.

The Army "Leavenworth" type pit incinerator, built one-half scale.

Modified urinal soakage pit with replaceable screened tin funnels.

brush pile in small pools. The fire is then started below and gradually built upward. This arrangement has several advantages.

(1) Simplicity: One Virginia negro, in the early stages of the camp, disposed of the excremental and garbage refuse for 2,000 persons.

(2) Availability: Almost every terrain contains a hillside or a small embankment that may be utilized for this form of incineration.

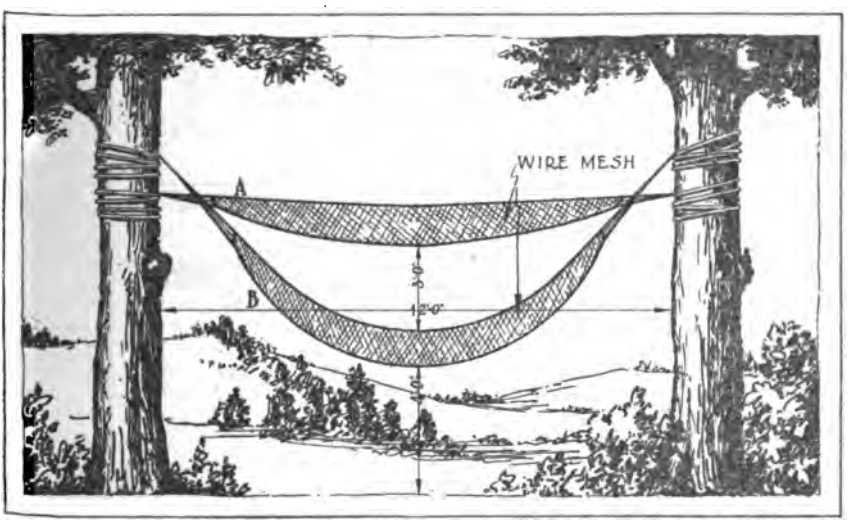
(3) Efficiency: Due to an increase of square area of evaporation and direct contact of fire with liquids, plans were under way for the development of this original idea until the receipt of Lelean's "Sanitation in War," when it was found that this author's "Inclined-Plane Incinerator" embodied the same principle and was similar in design to the plans under contemplation. A modification of the original ravine incinerator is still in use.

(B) MODIFICATION OF URINAL-SOAKAGE PIT.

This consists of the use of five-eighths inch iron piping with replaceable tin funnels, containing screening over the mouthpiece. The other specifications are the same as described in textbooks. Several of these are in use on the rifle range.

(C) MANURE INCINERATORS.

These are made of wire netting and strung by wire between trees. They can be easily improvised by the use of four iron rods and a coil of wire (or baling wire may be used). The fresh manure is placed in the upper wire hammock and a fire started in the dried manure of the lower hammock. This tends to dry out the fresh manure. Each morning the positions of hammocks "A" and "B"

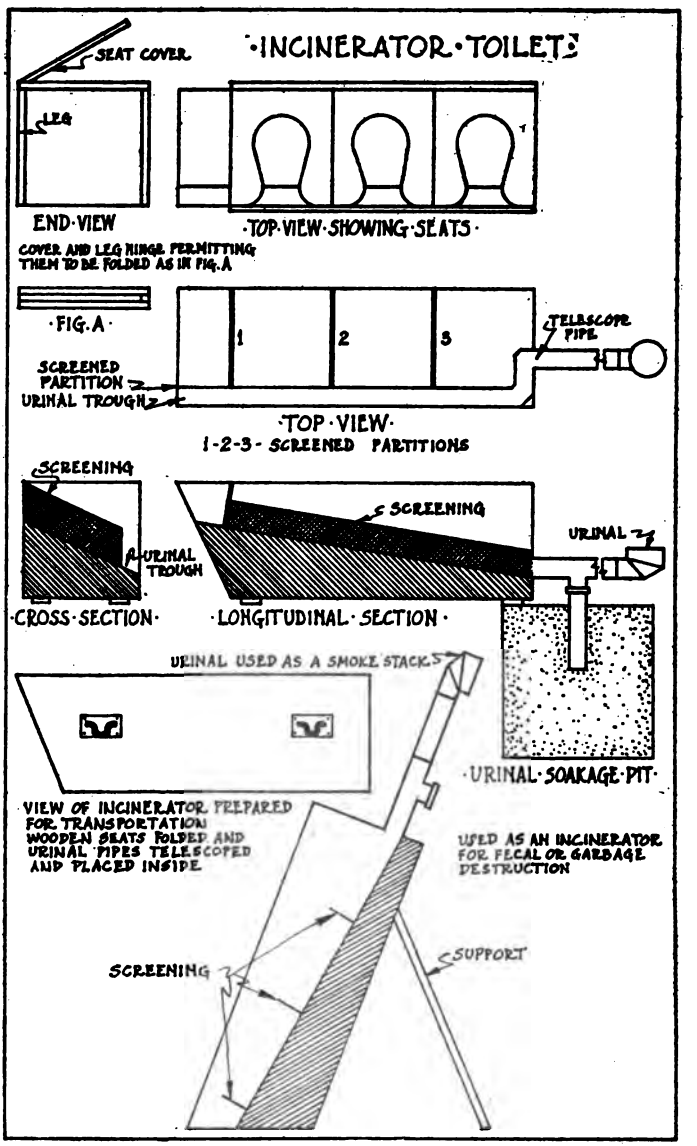


Manure incinerator. By tightening or loosening the lashings the relative positions of A and B can be changed.

are reversed and the fresh litter placed in the upper, and the fire started in the lower, and the process repeated. The value of the hammocks is in the creation of a draft. They may be swung, if necessary, to create it. The practicability of these devices is now under experimentation.

(D) COMBINED INCINERATOR, TOILET, AND GARBAGE DESTRUCTOR.

Incinerator toilets are on the market, but their weight (about 1,000 pounds) causes them to be impractical for field uses.



Scheme for incinerator toilet.

A row of latrines and urinals.

The "Lucas" and "Back to Back" modification of straddle trenches.

It appears possible to construct one similar to their design that has the "separator system" for urine and feces, permitting the urine and other liquids to be drained into soakage pits.

The solid refuse may be burnt out daily. One of these destructors will serve 100 men for excrement and garbage destruction.

Hospital Corps under instruction for expeditionary duties.—The accompanying illustrations show some of the field sanitary devices constructed by the corpsmen. The 'dugout dressing station" has been completed and equipped. A variety of latrines, incinerators, and urinals have been built in the trenches, the pictures of which were not completed in time for this report. A "shelter dressing station" is now under construction.

MOBILE LABORATORY UNITS.

By E. R. Sitt, Medical Director, and G. F. Clark, Passed Assistant Surgeon, United States Navy.

In cooperation with the Division of Sanitation of the Bureau of Medicine and Surgery, the United States Naval Medical School has equipped three laboratory units to meet the demands that may arise because of epidemics at the various training camps and stations. Two more units will be provided as promptly as possible, making a total of five units.

The units are to be based on the Naval Medical School and will be a part of the school, being merely sent to the points requiring them for such periods of time as may be necessary until the regular forces at the camp or station have sufficient opportunity to make provision for the work.

It is intended that the units shall not interfere with the usual medical work of the stations, but shall render every assistance possible in emergencies.

The personnel of each unit will depend somewhat upon the conditions to be met. For the larger camps, or during an unusual epidemic in some of the smaller ones, each unit would probably have one passed assistant surgeon, in charge; two assistant surgeons; six or more men who have had training in the preparation of media and stains, making stained preparations, blood counts and smears, plating methods, examination of urine, feces, and gastric contents, serology, and other laboratory work.

Two of the men will be required for preparation of media; two to assist in taking cultures and plating; one for urinalysis, preparation of pathological tissues for shipment, and as a general assistant. One will be used for serological work and clerical duties.

As will be noted in the list of material given below, each unit is thoroughly equipped to render all laboratory aid. Changes in the material will be made to meet special conditions of which we may learn prior to the sending of a unit.

CONTENTS OF MOBILE LABORATORY.

(WC=Working chest; SC=Supply chest; CR=Separate crate.)

Acetic acid, glacial	WC	50 c. c. glass stoppered bottle.
Agar, powdered	WC	250 gm. tin can.
	SC	Do.
Alcohol, ethyl, 95 per cent	WC	1,000 c. c. tin can.
	SC	Do.
Alcohol, ethyl, absolute	WC	500 c. c. glass stoppered bottle.
	SC	Do.
Alcohol, methyl, C. P	WC	Do.
	SC	Do.
Alcohol, denatured	WC	1,000 c. c. tin can.
	SC	Do.
Aniline gentian violet	WC	100 c. c. solution No. 1.
		100 c. c. solution No. 2.
Antigens	WC	Acetone, insoluble, 25 c. c.
		Schick test material, 100 tests.
		Cultures for agglutination:
		Typhoid—
		Para—A.
		Para—B.
		Dysentery, Shiga.
		Dysentery, Flexner.
		Cholera.
		Melitensis.
		Meningococcus, 25 cc.
		Parameningococcus, 25 cc.
Applicators, wood	WC	1 package.
Arnold, sterilizer	CR	
Azolitmin solution	WC	100 c. c. bottle.
Balances, assay or hand (AHT 21400)	WC	
Balances, Howard Trip	WC	
Beef extract, Liebig's or equivalent	WC	
Bichloride of mercury	WC	10 gm. bottle.
Bile, ox	WC	100 c. c. in nursing bottles.
Bismarck brown solution	WC	100 c. c. bottle.
Blake bottles, empty, 1,000 c. c	WC	6.
Bleaching powder	WC	1 can.
	SC	5 cans.
Blood, hemolysed-ether 10 per cent	WC	1,000 c. c.
Blood, serum-water in 8 oz. nursing bottles.	WC	6.
Bottles, specimen, wide mouth, 200 c. c.	WC	6.
.....	SC	25.
Broth, 0.1 per cent dextrose	WC	2,000 c. c. in 8-oz. nursing bottles.
Burettes, 50 c. c	WC	1.
	SC	1.
Burners, Barthel	WC	1.
	SC	1.
Burners, Primus or equivalent	WC	1.
Carbol fuchsin	WC	50 c. c. dropping bottle.
Case of pipettes, brass	WC	1 c. c. graduate 1–100, 6.
		5 c c. graduate 1–10, 3.
		10 c. c. graduate 1–10, 2.

CONTENTS OF MOBILE LABORATORY—Continued.

Can opener	WC	1.
Capillary pipettes		12 with nipples.
	WC	
Centrifuge, hand	WC	1.
Centrifuge, tubes	WC	12 graduates; 24 plain.
Chloroform	WC	50 c. c. amber drop bottle.
Clamps, screw, for rubber tubing	WC	3.
Clamps, spring, for rubber tubing	WC	3.
Cork borer	WC	1 set.
Corks	WC	1 lb. assorted.
Corkscrew	WC	1.
Cover glasses, square No. 1, ¼-inch	WC	1 oz.
Cylinders, glass measuring, 50 c. c	WC	1.
	SC	1.
Dextrose, C. P., anhydrous	WC	50 gm. bottle.
	SC	250 gm. bottle.
Distilled water	WC	500 c. c. bottle.
Dropping bottles	WC	2.
	SC	4.
Evaporating dishes, 4-inch	WC	1.
	SC	1.
Fehling's Sol	WC	50 c. c. bottle copper solution; 50 c. c. bottle alkaline solution.
File, triangle, 8-inch	WC	2.
Filter paper, round	WC	50 sheets, 4-inch.
	WC	50 sheets, 12-inch.
	SC	100 sheets, 4-inch.
	SC	100 sheets, 12-inch.
Forceps, thumb	WC	2 small, 2 large.
Forceps, dissecting, 6-inch	WC	2.
Fuchsin, basic	WC	10 gms.
Funnels, glass, 2-inch	WC	2.
Funnels, enamel, 1-liter	WC	1.
Funnel stand, universal	WC	1.
Giemsa stain	WC	100 c. c. glass stoppered bottles.
	SC	100 c. c. glass stoppered bottles.
Glass tubing, soft, assorted	WC	5 lbs.
	SC	5 lbs.
Gram's iodine solution	WC	50 c. c. drop bottle.
Guaiac resin	WC	25 Gm. bottle.
Hammer, carpenter's claw	WC	1.
Hand lens, AHT 30984	WC	1.
Hemacytometer, complete, in case	WC	Red cell pipette, white cell pipette, counting chamber and cover glass, lancet.
Hemoglobinometer, Tallquist	WC	1.
Homeopathic vials, in mailing case	WC	25.
Hone, razor	WC	1.
Hone, carborundum	WC	1.
Hydrochloric acid, concentrated	WC	50 c. c. glass stoppered bottle.
Immersion oil	WC	1 oz. bottle.
	SC	1 oz. bottle.
Incubator, American Standard; with complete equipment for oil heating.	CR	1.
Inoculating needles and holders	WC	2.
Inulin	WC	10 gms.
Jars, fruit, for anaerobic cultures; 2-quart.	WC	2.
	SC	4.
Lables, bottle	WC	200.
Labels, slide	WC	200.
Lactose, bacteriological use, powered	WC	50-gm. bottle.
	SC	250-gm. bottle.
Lamp, alcohol	WC	1.
Lamp, plumber's blast, AHT 23048	WC	1.
Lead foil	WC	1 lb.

CONTENTS OF MOBILE LABORATORY—Continued.

Lens paper	WC	1 package.
Litmus paper, red and blue	WC	1 bottle each.
Mailing cases, long and short	SC	10 each.
Mannite	WC	20-gm. bottle.
Measuring cups, enamel, 1,000 c. c.	WC	1.
Methylene blue, Löffler's	WC	50 c. c. drop. bottle.
Methylene blue, powered	WC	10 gm. bottles.
Micrometer, ocular	WC	1.
Microscope, complete	WC	1.
Objective, 16 mm., 4 mm., 2 mm.; oculars, low power, medium power, with diaphragm for micrometer.		
Abbé condenser	.....	
Mechanical stage	.....	
Millimeter rule	WC	1.
Miner's cups, enamel, 2 qt	WC	2.
Miner's cups, enamel, 1 qt	WC	2.
Mortars, 3-inch porcelain, with pestles	WC	1.
Nails and tacks, assorted	WC	1 lb.
Needles, for syringes:		
Fine	WC	12.
Coarse	WC	12.
Spinal puncture	WC	3.
Nipples, rubber	WC	6.
Nitric acid, concentrated	WC	50 c. c. bottle.
Nursing bottles, W. T. 8 oz	WC	24.
Nutrient agar:		
2 per cent in nursing bottle for Endo	WC	6.
1.5 per cent in tubes	WC	48.
2 per cent veal infusion agar, in tubes	WC	60.
Paper pads, medium size	WC	2.
	SC	6.
Paper, wrapping	SC	20 sheets.
Pencils, lead, medium hard	WC	6.
	SC	12.
Pencils, wax, for glass	WC	4.
	SC	8.
Peptone, Witte's or best substitute	WC	1-lb. bottle.
	SC	2-lb. bottle.
Peroxide of hydrogen	WC	50 c. c. bottle.
Petri dishes, 10 cm	WC	200.
	SC	200.
Phenol, C. P., cryst	WC	250 gm.
Phenolphthalein	WC	25 gm.
Pitchers, enamel, 2,000 c. c	WC	1.
Pliers, combination	WC	1.
Potassium iodide	WC	10-gm. bottle.
Pyrogallic acid	WC	250-gm. bottle.
Razor	WC	1.
Rubber apron	WC	1.
Rubber bands, assorted	WC	1 gross.
Rubber gloves, autopsy	WC	2 pairs.
	SC	2 pairs.
Rubber bandage	WC	1.
Rubber stoppers, assorted	WC	1 lb. solid and 1 lb. perforated.
Rubber tubing, one-fourth inch, for blood systems.	WC	6 feet.
Rubber tubing, one-half inch	WC	Do.
Safranin solution	WC	100 c. c.
Sauce pans, enamel, 2 qt	SC	1.
	WC	1.
Scalpels	WC	3.
Scissors, L. & S	WC	3.

CONTENTS OF MOBILE LABORATORY—Continued.

Screw hooks, brass, assorted	WC	12.
Scrubbing brushes, hand	WC	2.
	SC	4.
Serum (as may be required):		
Antipneumococcus, types 1, 2, 3	WC	1 bottle each.
Antimeningitis, polyvalent	WC	1 bottle.
Typhoid—		
Paratyphoid, A	.....	Do.
Paratyphoid, B	.....	Do.
Dysentery, Shiga	.....	Do.
Dysentery, Flexner	.....	Do.
Cholera	.....	Do.
Melitensis	.....	Do.
Serum, hemolytic (antihuman)	WC	2,000 units.
Slide boxes	SC	12.
Slides, microscope	WC	200.
	SC	500.
Slides, microscope, hollow ground	WC	12.
	SC.	24.
Soap, Ivory	WC	2.
	SC	12.
Soap powder	SC	10 lbs.
Sodium carbonate	WC	250 gm. bottle.
	SC	500 gm. bottle.
Sodium chloride	WC	25 gm.
	SC	500 gm.
Sodium citrate	WC	50 gm bottle.
Sodium hydroxide	SC	500 gm.
Sodium sulphite, anhydrous	WC	500 gm.
Stove, oil, 3-burner, with oven	CR	1.
Sterilizer,[1] American, standard autoclav, for oil heating with primus burner.	WC	1.
Spatula	WC	1.
Stitt's Manual of Bacteriology, etc	WC	1.
Syringes, all glass, 2 c. c., 5 c. c., 10 c. c.	WC	3 each.
Tape, cotton	WC	1.
Tape measure	WC	1.
Test tubes, assorted:		
Bacteriologic, 150 by 15 mm	WC	73.
	SC	432.
100 by 10 mm	WC	100.
	SC	300.
Test tube brushes	WC	4.
Test tube racks, 12 tubes	WC	1.
Test tube racks, 90 tubes, serological		4.
Thermometers:		
1°–100 C	WC	2.
	SC	2.
1°–200 C	WC	2.
	SC	3.
Toothpicks	WC	1 package.
Tr. iodine	WC	100 c. c. bottle.
Tripod	WC	1.
Twine	WC	1.
	SC	6.
Urinometer and cylinder	WC	1.
Vials, homeopathic	WC	12.
	SC	24.

[1] Dressing sterilizer, if conditions permit.

CONTENTS OF MOBILE LABORATORY—Continued.

Vise, bench	WC	1.
Weights for balances	WC	1 set.
Wire:		10
Iron, hay bale	WC	10 feet.
Copper, hay bale	WC	Do.
Wire baskets	WC	3.
	SC	6.
Wire gauze	WC	3.
Xylol	WC	50 c. c. drop. bottles.
	SC	500 c. c. bottles.

ADDITIONS.

Push pins	WC	3 packages.
Flasks, Erhlenmeyer	WC	
100 c. c		12.
250 c. c		6.
500 c. c		6.
Beakers, nest	WC	2.
Pump, filter AHT 28,000 ¼-inch	WC	1.
Note books	WC	2.
	SC	4.
Bottle for immersion oil	WC	1.
Clock	WC	1.
Graduate, 10 c. c	WC	1.
Watch glasses	WC	4.
Sponge	WC	1.

WOUNDS LIKE THOSE OF WAR OCCURRING IN CIVIL PRACTICE.

By W. M. BRUNET, Assistant Surgeon, United States Naval Reserve Force.

These few cases with detailed histories and treatment are cited with the idea that in some small measure they may prove instructive by considering first the diagnoses, next the errors of judgment that occurred in treatment, and finally those cases that were correctly treated.

CASE 1.

H. J., white, aged 42, laborer. Was shot in the abdomen with a 32-caliber revolver at a distance of 40 feet. Ball entered the abdomen about 2 inches below the umbilicus, and one-half inch to the left. Patient was taken to the hospital within one hour after being shot.

Examination.—Well-developed, muscular man, apparently suffering from shock, who thought he was dying. Face pale and covered with a cold, clammy sweat; pulse rapid, abdomen rigid, marked tenderness over the left lower quadrant.

Treatment.—When first seen tincture iodine was poured into the wound, and a sterile dressing applied. After reaching the hospital

he was treated for shock. Hot water bottles were placed in the bed, and one-quarter grain of morphine was given hypodermatically. In four hours he had reacted well, and a laparotomy was done.

Operation.—Peritoneal cavity entered through median abdominal incision. The belly wall was retracted, and the peritoneum under the superficial wound was found to be intact. Careful inspection of the viscera yielded negative results. Abdomen closed in usual manner without drainage. Patient made an uneventful recovery.

Postoperative.—After a three-weeks' stay in the hospital the patient was taken to a roentgenologist, and the bullet was located in the muscles of the left lumbar region. Patient refused to have the bullet removed. However, it has caused no symptoms since the injury, about two years ago.

Comment.—This case was an error of judgment. The patient should have been observed a longer time, and X-rayed before operation.

CASE 2.

J. P. H., white, aged 36, railroad-construction foreman. Was struck on the head with a piece of flying stone from a blast. Patient was 40 yards away from the explosion, and the stone weighed about 7 ounces. He was taken to the city three hours after receiving the injury.

Examination.—Fairly well nourished and developed man; unconscious; large laceration of scalp, with a depressed fracture over the right temporo-parietal region; unequal pupils, reacted to light and accommodation but slowly; pulse 42; respiration 10 to 12 per minute.

Operation.—Horseshoe-shaped incision over the right temporal area; flap reflected downward, revealed a compound comminuted fracture; hemorrhage profuse; upon removal of the many pieces of bone a large extradural clot was exposed; the clot was removed and the rough edges of bone smoothed off; the dura was punctured in many places by spicules of bone, and the minute hemorrhages from a number of vessels, which could not be satisfactorily stopped, necessitated the packing of the cavity; plain gauze was used as a packing.

Postoperative.—Head of bed elevated; ice cap to head; bromides per rectum for restlessness; a soapsuds enema was given, followed by saline, 1 pint every four hours. After 24 hours the mental condition cleared up rapidly, and the patient could answer questions fairly well. Gauze packing was loosened after 48 hours, and completely removed in 96 hours. After the patient was able to swallow, urotropin, 10 gr. well diluted with water was given every four hours. Convalescence uneventful. Patient went home in four weeks. He has severe headaches at times, but a saline cathartic promptly

clears up the condition. He returned to work after three months, but was blast-shy. Last heard from about six months ago—at work, and doing well.

Comment.—This case is interesting from the fact that of the head injuries seen in civil practice by me, the more severe cases do much better than the simple linear fractures. This patient received a very extensive compound fracture of the vault, which cleared up after operative interference.

CASE 3.

R. R. J., white, aged 35, traveling salesman. While dressing in his room his wife removed a revolver from the dresser drawer, and it "went off," the bullet striking him in the left side of the forehead just above a line drawn from the external canthus. He was brought to the hospital within one hour after the accident.

Examination.—Well nourished and developed man; unconscious, with a bullet wound in left side of forehead. Pupils unequal and responding very slowly to light; hemorrhage in and around both orbits.

Treatment.—When first seen the site of the wound was painted with tincture iodine and a sterile dressing applied. Hospital treatment: Bed elevated; ice cap to head; soapsuds enema, 1 pint given every 4 hours followed by saline. In 24 hours the patient was regaining consciousness. At this time a fundus examination of both eyes revealed the following: Left eye, a marked hyperemia of the optic nerve and the hemorrhagic condition of the eye interferes with a clear vision of the field. Right eye, minute hemorrhages in the fundus. After 10 days the right eye cleared up nicely; left eye blind, optic nerve destroyed. Recovery uneventful. An X-ray examination at this time revealed the bullet under the right frontal lobe of the cerebrum. Operation for removal of the bullet refused. Left the hospital in two weeks.

Comment.—This case is interesting from the course of the bullet and the damage which it produced. It severed the left optic nerve and produced a concussion of the right optic nerve, which cleared up very quickly. I am of the opinion that the reason the missile did not produce death was because of the inferior quality of the weapon and the age of the ammunition. I was told that the cartridges had been in the pistol for two years or more. The course of the bullet was across the left orbital fossa, ranging upward through the roof of the right orbit. It lodged under the right frontal lobe of the cerebrum. I could never get any information about this man after he left the hospital, and the case was not followed.

CASE 4.

H. H., negro, aged 25, laborer. In a Saturday night row over a "crap game" the patient was said to have been hit in the head with an axe and stabbed in the head with a knife. After the fight he went to his shack and did not report for work for some days, his companions reporting that he was feeling sick. After a lapse of 10 days he was seen by the camp physician, who found him with a temperature of 103 F. and a left hemiplegia. He was brought to the hospital for treatment.

Examination.—Well nourished and developed negro; temperature, 103 F.; pulse, 60; respiration, 26; blood pressure, 160 m. m.; pupils unequal. Two small scars over the right parietal region. Left hemiplegia.

Operation.—Usual horseshoe shaped incision made over right tempero-parietal region; flap reflected downward. Upon turning the flap down a small piece of metal was found embedded in the bone, flush with the contour of the vault. It was impossible to remove it with forceps. A trephine was used to remove a button of bone and the guide was placed near the piece of metal. Upon removal of the button of bone the piece of metal proved to be a broken off knife blade, which projected five-eighths of an inch into the cranial cavity. With difficulty the trephine opening was enlarged, the dura being so tense that it bulged into the opening and caused considerable trouble. The edges of the dura where they had been in contact with the metal knife blade were very black. The dura was incised freely, and a quantity of pus and disintegrated brain tissue flowed into the wound. The destruction of brain tissue was very extensive, and a cavity was left after the evacuation of pus and débris into which a lemon could have been placed. Rubber tubing was used for drainage, and sewed into the lower angle of the wound. The patient lived 10 days after the operation.

Post-mortem.—The skull cap was removed and the condition found was a Streptococcus lepto-meningitis. The cavity in the brain tissue was 3 by 4 inches, and it seemed quite remarkable that the man survived the operation as many days as he did.

Comment.—This man should have been seen earlier by a physician. He should have had an X-ray examination prior to operation. He might have been attended by the company's physician had not word been received that the patient would be at work in a day or two. No radiographer was available when the man was brought to the hospital, and with the history and the physical findings, the exploration seemed advisable.

CASE 5.

J. W., negro, aged 32, cook. Was shot in the buttocks with a .44-caliber Colt revolver at a distance of 30 feet; came to the hospital two days after being shot.

Examination.—A very large fat negro, with four gunshot wounds in buttocks. The bullet entered the right buttock, and passed through the left, only injuring the muscles of this region. Both buttocks were swollen and extremely tender.

Operation.—The wounds were incised freely, but not laid open, and a large rubber tube was used for through and through drainage.

Treatment.—The wounds were irrigated twice daily with a cherry-red iodine solution, and the dressings kept wet with the same solution. Patient left the hospital in one week.

Comment.—It might be asked why the wounds were not laid wide open. I think the incision of the gluteal muscles in the presence of such an infection as we had here would have been bad surgery.

CASE 6.

J. H., negro, aged 28, laborer. In a railroad camp brawl he was shot in the left side of the abdomen with a .38-caliber Colt revolver at a distance of 20 feet. He was seen by a physician a few hours after being shot, who applied a sterile dressing. Patient was brought to the hospital 18 hours after receiving injury.

Examination.—Fairly well nourished and developed negro, in a very serious condition; temperature 102 F., pulse 112, respiration 22 per minute. Large gunshot wound in the left side of the abdomen just below the costal margin. Abdomen tympanitic and rigid; upon removal of the dressings from the wound a fecal odor was detected.

Operation.—High median incision. Upon opening the peritoneal cavity a large quantity of blood, feces, and undigested food were found free in the abdomen. At this stage of the operation the patient died. After death the abdominal viscera were thoroughly explored. The bullet entered the left side just below the costal margin in the mid-axillary line and, passing upward and to the right, penetrated the splenic flexure of the colon, stomach, and liver, went through the diaphragm, and lodged in the right lung.

Comment.—This abdomen was opened too late. Immediate operation might have saved the patient.

CASE 6.

H. W., white, age 12. While playing with a .22-caliber rifle he accidentally pulled the trigger, and the bullet entered the abdomen just below the umbilicus. He was seen within a short while after

the accident and taken immediately to the hospital, a sterile dressing having been applied.

Examination.—Very well developed and nourished boy, with a small bullet wound below the umbilicus. Small amount of hemorrhage from wound. The little patient complained of pain in the region of the wound.

Operation.—Median incision slightly to the right. Upon opening the peritoneum a small quantity of blood and partly digested food flowed into the wound. The small intestine was found to be perforated in four places, and in one section a round worm had been cut in two by the bullet, and another worm was halfway in the lumen of the intestine and half in the abdominal cavity. Further down in the intestine a large mass of round worms was found which almost occluded the lumen of the gut. The four perforations were sutured and the line of sutures inverted. Two rubber-tube drains were placed in the wound, one at each end.

Post operative.—Bed elevated; saline introduced per rectum one-half pint every four hours. Morphine (gr. $\frac{1}{12}$) given subcutaneously every eight hours for pain. After three days the drainage tube in the upper angle of the wound was removed and the tube in the lower angle shortened to about one-half its length. On the fifth day a vermifuge was administered, and a large number of round worms were expelled. Patient was up in bed at the end of 10 days and home in 3 weeks.

Comment.—This case simply demonstrates afresh the value of early operation in all gunshot wounds of the abdomen where there is injury of the viscera.

REPORT OF CASES TREATED ON THE U. S. S. OLD COLONY DURING THE HALIFAX DISASTER.

By H. C. Pettibone, Assistant Surgeon, United States Naval Reserve Force.

The U. S. S. *Old Colony* was lying in the harbor of Halifax, Nova Scotia, at the time of the terrible disaster on December 6, 1917, which resulted from the collision of two ships, one on fire and the other loaded with ammunition. Medical and surgical treatment was given to 94 sufferers, both civil and military, and patients were retained on board and treated for periods varying from 1 to 10 days. Some of the injuries were of such a trivial nature that the patients left the ship immediately after receiving first aid, during the most acute stage of the emergency and before a full record of the work done could be written up. These cases numbered 18.

Two cases remained aboard for 10 days, 21 cases for 7 days, 5 cases for 6 days, 15 cases for 5 days, 7 cases for 4 days, 6 cases for 3 days, 11 cases for 2 days, 4 cases for 1 day.

There were 4 deaths on board.

	Cases.		Cases.
Abscess of neck	1	Fracture of ribs	2
Amputation of both feet	1	Gangrene of left forearm	1
Amputation of left forearm	2	Injury to eyes	1
Bruises, cuts, and minor wounds	83	Injury to toe	1
Burns, extensive	1	Internal injuries and pneumonia	1
Burns of eyes	2	Pott's fracture	1
Dislocation of shoulder	2	Punctured wounds	1
Fracture of arm	2	Strain of right hip	1
Fracture of femur	1	Synovitis of knee	1
Fracture of leg	2	Trauma of both eyes	1
Fracture of radius	2		

Some of the cases not given in the above table were patients on ship or at hospital in Halifax before the disaster. For example there was 1 man convalescing from pneumonia, from H. M. S. ———.

BOOK NOTICES.

THE THIRD GREAT PLAGUE, by *John H. Stokes, A. B., M. D.*, Chief of the Section of Dermatology and Syphilology, Mayo Clinic, Rochester, Minn. W. B. Saunders Company, Philadelphia, Pa., 1917.

The ideal book for the physician to put in the hands of a luetic patient in order to secure his intelligent cooperation toward a cure.

IMPOTENCE AND STERILITY, by *G. Frank Lydston, M. D., C. L.* The Riverton Press, 25 East Washington Street, Chicago, Ill., 1917.

The 100 pages of this volume devoted to the subject of sex-gland implantation are of special interest.

A CLINICAL MANUAL OF MENTAL DISEASES, by *F. X. Dercum, A. M., M. D., Ph. D.* W. B. Saunders Company, Philadelphia, Pa., 1917.

MILITARY SURGERY, by *D. P. Penhallow, S. B., M. D.* Oxford University Press, London, 1916. (American branch: 35 West Thirty-second Street, New York.)

This work is based on the author's experience at the American Women's War Hospital, Paignton, England, and on contributions to current medical literature. 151 illustrations, 400 pages.

NEUROSYPHILIS (Modern Systematic Diagnosis and Treatment), by *E. E. Southard, M. D., Sc. D., and H. C. Solomon, M. D.* W. M. Leonard, Boston, Mass., 1917.

The subject is presented in 137 case histories and based on a study of 2,000 cases of neurosyphilis and 100 autopsies. Neurosyphilis and the war occupies 100 pages.

WAR SHOCK. The Psycho-Neuroses in War Psychology and Treatment, by *M. D. Eder, B. Sc., M. R. C. S., L. R. C. P.* P. Blakiston's Son & Co., Philadelphia, Pa., 1917.

Based on the first 100 consecutive cases of psychoneurosis coming under the writer's care while in charge of the psychoneurological department, Malta.

DISEASES OF THE HEART. A Clinical Treatise for the General Practitioner, by *Edward E. Cornwall, Ph. B., M. D.* Rebman Company, New York, 1917.

As the author states, this is not an exhaustive treatise. It offers a very simply written, practical clinical presentation of many features of diseases of the heart. Part II, dealing with general and special therapeutics, exercise, and diet, is particularly useful.

BLOOD TRANSFUSION. Hemorrhage and the Anaemias, by *B. M. Bernheim, A. B., M. D., F. A. C. G.* J. B. Lippincott Company, Philadelphia, Pa., 1917.

HISTORY OF MEDICINE, by *F. H. Garrison, A. B., M. D.*, Principal Assistant Librarian, Surgeon General's Office, Washington, D. C. W. B. Saunders Company, Philadelphia, Pa. (2d edition), 1917.

FRENCH-ENGLISH MILITARY TECHNICAL DICTIONARY, by *Colonel C. De Witt Willcox, U. S. A.*, Professor of Modern Languages, United States Military Academy. Government Printing Office, Washington, D. C., 1917.

Contains a supplement giving the most recent military and technical terms.

TYPHOID FEVER Considered as a Problem of Scientific Medicine. By *Frederick P. Gay.* Macmillan Company, New York. 1918.

The absence of an index is a serious drawback and lessens very decidedly the value of this monograph as a reference book.

PRINCIPLES OF HYGIENE. By *D. H. Bergey, A. M., M. D., Dr. P. H.* Second edition. W. B. Saunders Company, Philadelphia. 1918.

The chapter on naval hygiene is extremely meager and in no sense up to date. It is remarkable that a writer living in Philadelphia, the seat of one of our principal navy yards, should undertake to write a chapter on naval hygiene while himself so unfamiliar with the naval service, from which his figures are derived, as to use the word "marine" incorrectly. He speaks of the rigid character of the examination required "in the selection of marines," but his figures as to height, weight, vital capacity, etc., are based on examinations of candidates for the United States Naval Academy, reported by Dr. Gihon, who died as a retired medical officer 16 years ago. His figures in regard to the daily ration supplied to United States "marines" are based on an article published by Dr. Henry G. Beyer 19 years ago relative to the regular naval ration. Of this short chapter two pages are devoted to quoting obsolete regulations covering the enlistment of boys between the ages of 15 and 17 (sic). In discussing principal diseases among marines the author gives figures for the year 1899, and among these figures he gives admissions for typhoid fever, 134.

In so far as the Navy is concerned, chapter 14 may be regarded as obsolete. One would be justified in concluding from a perusal of this chapter that no advances had been made in naval hygiene, and that the author had not even considered the possibility of such advances, since he has apparently made no effort to acquaint himself with the conditions that prevail in modern navies—the Navy of his own or of other countries. If the rest of the book is on a par with this chapter, the figure "1918" on the title-page is misleading.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, double spacing and wide margin are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterhead, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles, but still more so in reviews. For example, an article by P. A. Surg. G. Alen, U. S. N., on Removal of the Gasserian Ganglion, should be headed as follows:

Removal of the Gasserian Ganglion.
By G. Alen, Passed Assistant Surgeon, United States Navy.

If a review is submitted of an article by J. E. Thompson, M. B., B. S. (Lond.), F. R. C. S. (Eng.), F. A. C. S., Galveston, Tex., Professor of Surgery, University of Texas, entitled "A Study of Modern Operations in Hypospadias from an Anatomical and Functional Standpoint," appearing in Surgery, Gynecology, and Obstetrics, Volume XXV, No 4, October, 1917, the following heading would conform to the usage of the BULLETIN in recent years:

Thompson, J. E. Modern Operations for Hypospadias. Surg., Gynec., and Obst., October, 1917.

The author's initials are important, not so his titles. If the reviewer is not familiar with the exact abbreviation employed by the Index-Catalogue of the Surgeon General's Library and the style adopted by the American Medical Association Press, it is best to write the name of the periodical in full.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

Only the names of actual reviewers for a current number appear.

The BULLETIN intends to print only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

VOL. XII NO. 3

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PUBLISHED FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

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1918

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20 November
1915

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This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

NOTE.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties, with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General United States Navy.

THOMAS YOUNG, M. D., 1773-1829.

Reproduced from an engraving of the portrait by Sir Thomas Lawrence, R. A., by kind permission of John Murray, London.

U. S. NAVAL MEDICAL BULLETIN.

VOL. XII. JULY, 1918. No. 3.

SPECIAL ARTICLES.

PLAN AND DESCRIPTION OF A FLEET HOSPITAL SHIP.

By E. M. BLACKWELL, Medical Inspector, United States Navy.

In designing a hospital ship, probably the most essential feature is the proper grouping and arrangement of the various compartments, coordinating the ship's work so that it can be carried on with the greatest convenience to all and with as little loss of time, space, and motion and with as few assistants as possible. The designer must have a broad perspective and not be prejudiced in favor of one branch or specialty in medicine or surgery to the detriment of another and thus inclined to provide most generously and adequately for one while making insufficient provision for another. We know how prone the various specialists are to consider their own particular specialty the most important of all, and for this reason the grouping and arrangement of the various rooms and compartments in a hospital or hospital ship should be left to some one who has a good general knowledge of the requirements of each of the special branches and can view and provide for each adequately and impartially without detriment to the others. He can then call on the specialists to assist in working out the details of the various divisions.

The construction and arrangement of a hospital ship is very different from that of a hospital. There is just so much space available in the ship, and that space is confined to the limits of the hull and deck houses above it, and one can not add wings or extend the ship and give it any shape or arrangement desired, as can be done with hospitals, while even simple changes are much harder to effect. The compartments must be smaller and wards and berthing spaces more crowded and congested, and hence natural ventilation and light are not so good as in hospitals.

The various necessities and details of the arrangement of a hospital ship can only be taken in collectively and properly coordinated, so as to make for convenience and prevent loss of time, space, and motion in carrying on the work, after long practical experience in the actual workings of a hospital ship in active service, and through practical familiarity with the work, duties, and requirements that must be met and accomplished. Theoretical knowledge can not

take the place of practical knowledge and experience in designing and constructing a hospital ship. It is a well-known fact that many business enterprises, such as factories, hotels, hospitals, etc., have been financial failures or have had to have extensive alterations made on account of the inconvenient arrangement of the buildings and the consequent increase of work and expenses and the delays and loss of time in carrying on the work. This applies with equal or more force to a hospital ship and the greatest of care should be exercised by the designer in having the various compartments, wards, operating rooms, laboratories, offices, galleries, mess rooms, pantries, toilets, and storerooms conveniently arranged and heated so that the work can be carried on with a minimum of delay, exertion, attendants, and expense and with the greatest convenience to all.

The accompanying plans have been worked out after over eight years' close study of the subject and five years of practical work and experience on a hospital ship under varying conditions of active service with the fleet. In the last year, owing to the great expansion of the Navy and the consequent sickness and epidemics among the recruits, nearly as much work was done on board the only hospital ship of the Navy at the time as was accomplished by it in seven years previous. The services and duties required of the hospital ship have been considered from about all of the different standpoints and nothing that is practicable has been left out of the plans that would add to the better care, treatment, comfort, and contentment of the patients, officers, and crew of the ship. Experience has shown about how many patients should be provided for on a hospital ship in ordinary times of peace and also during the great expansion of the Navy in the present war, and these requirements have been amply met, with a good margin for greater emergencies, in the plans presented herewith.

A large hospital ship is not so desirable as two medium-sized ones from the fact that the larger one would scarcely ever be filled to near its capacity, except occasionally for short periods during wars or epidemics, and then should be supplemented by sufficient ambulance ships to relieve the congestion and carry the patients to base hospitals, where they should be treated rather than on hospital ships. A very large ship would be expensive to run with a few patients aboard and could only be in one place at a time, and if it became necessary to lay it up for repairs there would be no relief for it, whereas two hospital ships could serve at different points and with different fleets at the same time and act as reliefs for each other, so that the fleet would never be without a hospital ship in attendance. Hospital ships with normal capacities of about 200 beds for the sick when the berths are not superimposed, of 400 when superimposed, and of about 500 when filled to capacity would meet the require-

ments of the service better than larger ships. The hospital ship generally has a large out-patient clientèle, but at least three-fourths of its work is on patients regularly admitted to the sick list of the ship, so the comfort, care, and treatment of those on board should be the first consideration.

As the hospital ship is for the sole purpose of caring for the sick and wounded, the arrangement of the medical department of the ship, as approved by the Bureau of Medicine and Surgery, should be strictly adhered to by the constructors and should not be changed in any respect unless it interferes with the structural strength of the ship. As in hospitals, there should be no unnecessary ornamentation and filagree work; but everything should be plain and simple, and there should be as few cracks, corners, angles and dead spaces as possible to harbor dust, dirt, vermin, etc., and interfere with keeping the ship clean and sanitary.

In arranging the medical department of this ship it has been the endeavor to leave sufficient space for all that is necessary in the deck and engineer departments of the ship; but as the sole purpose of the ship is the care and treatment of the sick and wounded the maximum of space should be assigned to the medical department. Whenever there is any question as to the use of space for the various departments, preference should be given to the medical department unless it would interfere very materially with the running of the ship or its structural strength and features. An attempt has been made to group rooms and compartments that have a good deal in common close and conveniently to each other, so that time will not be lost in communication, and also to have easy and convenient communication between the various parts of the same deck and between the different decks, as nothing makes for delays and inefficiency more than bad communications, which are often the cause of failure in the management of affairs.

The accompanying plans are necessarily imperfect and incomplete, as, not being a naval architect or draftsman, the writer has not the technical ability to make working plans of the ship. They are sufficiently plain, however, to show the naval constructor just what arrangement of the various compartments should obtain in the medical department and berthing spaces, and there has been as little interference with the navigating and engineer departments as possible, while at the same time making the plans and the relations of the various departments intelligible. The plans have been drawn to scale and sufficient space has been given to each room and compartment for the installation of all necessary apparatus and equipment and for the work to be carried on therein and the various uses required of them. After the various rooms and compartments are satisfactorily planned, the installation of the equipment is comparatively easy.

GENERAL CHARACTERISTICS OF THE SHIP.

The general characteristics of the ship, in accordance with the plans, should be about as follows:

Length over all	feet	435
Length, water line	do	420
Beam	do	55
Depth of hold	do	40
Draft, loaded	do	21
Displacement, about	tons	8,500
Engines (turbine), electric drive.		
Speed, cruising	knots	15
Speed, full power	do	18
Cruising radius, about	miles	8,000
Fuel, oil, about	gallons	250,000

The ship will have four decks in the hull, including the hold, two above and two below the water line, and four decks above the hull, including the bridge and top of the deck house, making eight decks in all, six of which will be above the water line, thus making the living spaces light and airy. The ship will be high out of the water, which will necessitate the stowing of heavy cargo weights and ballast below to keep it steady. Some of the oil and water tanks might be arranged to act as antirolling tanks, which, I understand, have given satisfaction in passenger ships. I am informed that gyroscopes in vessels as stabilizers are of doubtful utility and that few passenger ships have them, their utility not having been satisfactorily proved in those ships in which they have been installed. In view of this and the additional expense and difficulty of installation, the space taken up, the extra power required for it, as well as the expense of maintenance, the installation of one in this ship has not been contemplated. If, however, it were desired to install one, the space occupied by some of the after oil tanks could be used for that purpose, but this would decrease the cruising radius of the ship.

Bridge deck.—The bridge is located over the pilot house, the chart room, and the navigator's storeroom, and is half a deck above the rest of the deck, which extends over the commanding officer's and master's cabins and quarters and the deck and engineer officers' mess room and quarters. This deck is 28 feet wide and extends from frame 45 to frame 105. It has no inclosures or obstructions on it except the tops of two elevator shafts, the engine room and fireroom skylights, and two gravity tanks.

Boat deck.—This deck extends from frame 44 to frame 142, and between frames 49 and 133 it is the full width of the ship. The deck house, which is 28 feet wide, extends from frame 45 to frame 105 and contains the following compartments from forward aft: Pilot house with chart room and navigator's storeroom adjoining, half a deck above the rest of the deck; the master's cabin with stateroom, toilet

pantry, and yoeman's office adjoining; the commanding officer's cabin with stateroom, toilet, and pantry, with wireless office forward of pantry. Then come the first officer's and the chief engineer's quarters, each with a small office adjoining. On one side of the fireroom uptake is the ship's officers' pantry and on the other a toilet and small mess storeroom. On each side of and aft of the engine room uptake are the ship's officers' staterooms, 10 in all, with a toilet and small country between. This deck has communications with the decks below by two elevators and two inside stairways and four outside ladders. An elevator and a stairway are located in the passageway between the commanding officer's and the master's quarters between frames 55 and 63, and also another between the first officer's and chief engineer's quarters between frames 74 and 76. They run from top to bottom of the ship and give excellent access to the various decks.

On each side of the deck house there is an open deck 18 feet wide on which most of the boats are stowed. The boats contemplated for this deck are two 35-foot motor boats, two 33-foot motor sailing launches, two 33-foot sailing launches, four 30-foot cutters, four 30-foot whale boats, one 21-foot motor dory, and one 21-foot dinghey, together with as many life rafts as may be necessary, which can be stowed on the after part of the deck. In addition there will be two 40-foot motor-ambulance boats stowed on the forward deck below. Attention is directed to the fact that the heavier boats are located where they can be handled with the winches and booms. These boats and rafts will be capable of accommodating all the officers, men, and patients in case of "abandon ship."

Superstructure deck.—This deck extends the full length and breadth of the ship. From the bow to the deck house at frame 45 is an open deck, the forecastle deck, on the after part of which two ambulance boats will be stowed. This deck will furnish an excellent place for exercise and recreation for the crew and patients in good weather. The deck house begins at frame 45 and extends aft to frame 104, where there is a break between it and the isolation wards, which begin at frame 113 and extend aft to frame 132, where there is a 6-foot passage, aft of which are 2 detention rooms and a space for laboratory animals. The deck house is 36 feet wide, and on each side is a covered promenade deck 9 feet wide, which will be excellent for exercise and recreation. This deck communicates with the deck below by eight ladders and a companionway on the forecastle.

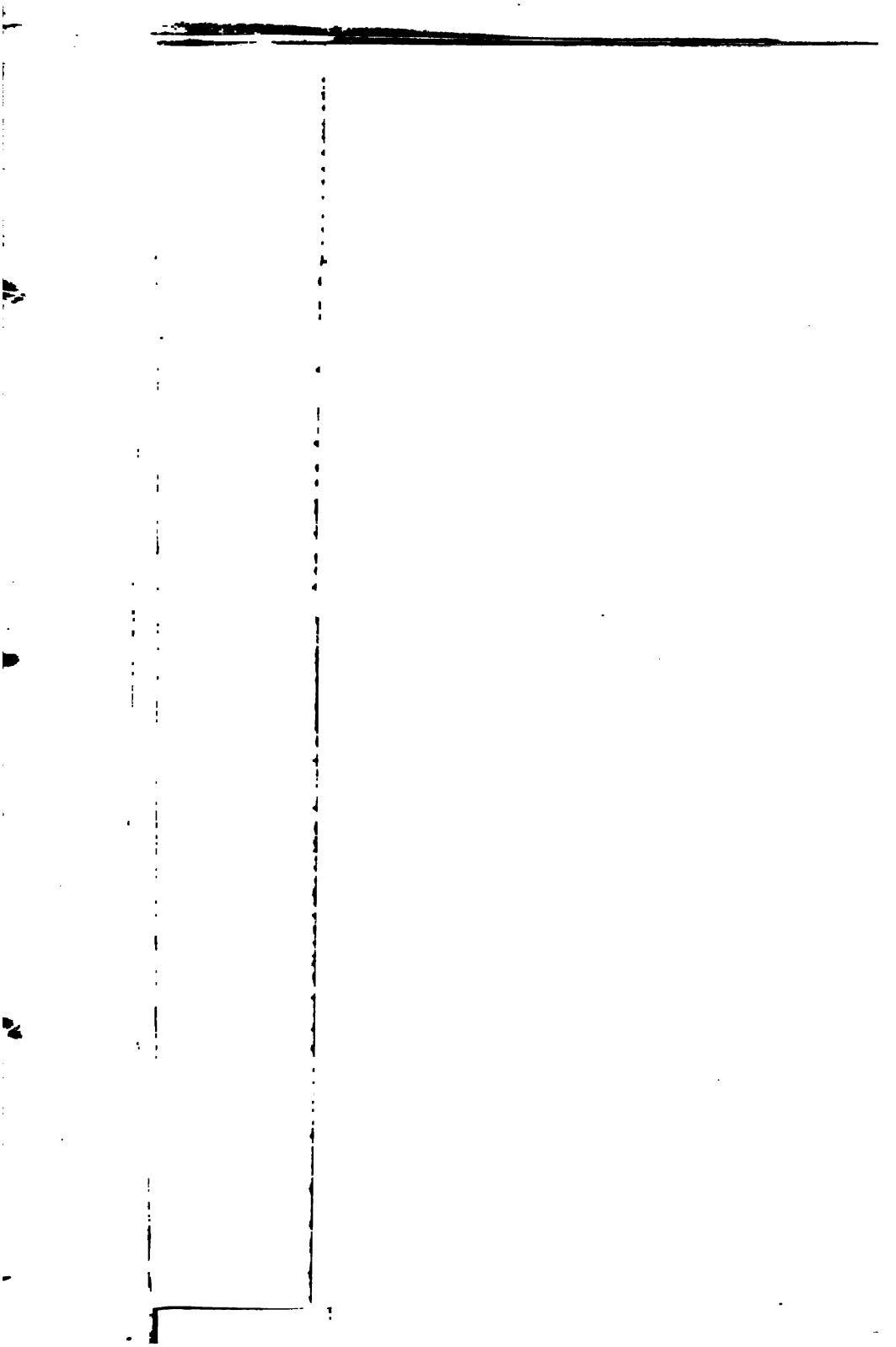
The compartments of the deck houses will be named in order from forward aft. The main operating room, etherizing room, wash room dressing and recovery room, sterilizing room, lobby, and elevator accupy the space from frame 45 to frame 58. The operating room is 35 feet long by 18 wide and 12 high. It will be equipped with two

operating tables and all other necessary apparatus. It has 11 large ports, which will give all the natural light and ventilation desired. It opens out into a lobby, into which open the etherizing room, the wash room, the recovery and dressing room, the sterilizing room, and the elevator, which makes all of these rooms very convenient to the operating room.

Abaft of these rooms is a 6-foot athwartship passage, and then come the sick officers' quarters from frame 60 to frame 78. These quarters comprise eight rooms, each 9 feet by 12, and a mess and recreation room 30 feet long by 12 wide, with a wing on each side 9 feet by 12 running to the outer deck, thus giving through and through light and ventilation. The rooms will be equipped with hospital beds and other necessary furniture. These quarters open aft into a passage, into which open a pantry, room for hospital corpsmen in attendance, an elevator, and a toilet. The medical officers' pantry opens into this passage and extends aft along the right side of the fireroom uptake to the wardroom. The wardroom, or medical officers' mess room, is located between the fire and engine room uptakes. It is 12 feet by 35 and runs athwartship from one side of the deck house to the other, giving it excellent through and through light and ventilation. There are 10 rooms for medical officers located between the wardroom and the after end of the deck house, with a small country between them into which open the rooms and the toilets. The executive surgeon has a private toilet attached to his quarters.

At frame 104 there is a break in the deck house to frame 113, where the isolation wards begin. There are six of these wards in all, each with a separate toilet containing a water-closet, washbasin and shower bath. The two forward wards are 17 by 18 feet and have 14 beds each. The two middle wards are 11 by 18 feet and have 8 beds each. The after wards are 12 by 16 feet and have 8 beds each, making 60 beds in all. Abaft of these wards are 2 rooms for hospital corpsmen in attendance, a pantry, and a disinfecting and wash room. There is then a 6-foot athwartship passage abaft of which are 2 detention rooms for the observation of undetermined cases until the diagnosis can be fully determined. Three beds can be placed in each of these rooms if necessary.

It would appear at first that six wards and two detention rooms for contagious cases are too many; but experience has shown that this number is not excessive. There have been many instances where there were as many as six or seven different kinds of contagious cases aboard at the same time besides three or four undetermined cases, which should have been segregated. It would be impracticable to provide permanently as much space as is necessary to accommodate all the contagious cases in a severe epidemic; but provisions should be made for expanding in case of need. This expansion has been



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provided for in these plans, as the venereal wards in the afterpart of the ward deck can be entirely and easily blocked off from the rest of the ship and mild contagious cases such as mumps and measles, which form the great majority of contagious cases, kept there. This would give 132 beds for contagious cases. Besides this 50 or 60 patients could be accommodated under awnings on the decks around the isolation wards, making accommodations for about 200 cases in all, which would probably meet nearly every condition. Two railings or screens 8 or 10 feet apart will run across the deck forward of the wards to keep contagious cases within their confines.

Abaft of the detention rooms is a space for laboratory animals consisting of two rooms for housing in cold weather, two runways outside, and a feed locker. On each side of this deck house is a ladder going down to a large disinfecting room on the next deck. Infected articles can be put down these ladders into the disinfecting room, from which there is a chute down to the laundry.

First or main deck.—The hull of the ship extends up to the deck above this one as far back as frame 28, where the sides of the ship are cut away from above and continue with this deck to the stern of the ship. The anchor engines and deck gear occupy the forward part of this deck back to frame 11, abaft of which to frame 20 come the toilets for the seamen petty officers and the messmen; and the barber shop and toilet on the right side and the Hospital Corps wash room and toilet on the left. From frame 20 to frame 26 the patients' recreation room is located. It is 18 feet wide and about 50 feet long, extending clear across the ship. It has large ports and doors at each end and a large hatch which will make it very light, airy, and comfortable, and an excellent lounging place for convalescent patients.

From the after bulkhead of the recreation room a covered gangway deck 9 feet wide extends along each side of the ship to the stern. The deck is wide enough to allow benches and chairs alongside the deck house for the accommodation of patients and leave plenty of room for a gangway.

The deck house on this deck is 36 feet wide, and in the forward part of it between frames 26 and 42 are the Hospital Corps quarters, containing 68 beds. This is a very light and airy compartment and would make an excellent ward, but it is very public and noisy, being located right under the winches and forecastle deck, where there is generally work going on and many hands are present. In the afterpart of the compartment is a large hatch with ladders to the deck below. On each side of this hatch is a blower room for ventilating the wards and other spaces below. Abaft of the Hospital Corps quarters is a 6-foot athwartship passage at each end of which will be installed an extension crane with a trolley for hoisting patients aboard in stretchers.

From frame 44 to 58 are located the dental rooms and eye, ear, nose, and throat rooms on the right side, and a small operating and examining room and the X-ray rooms on the left side. Between these rooms runs a fore and aft passage with a lobby and benches for patients and others who are awaiting their turns for examination, treatment, etc.

The dental rooms consist of an office with two dental chairs for operative work and a laboratory for other work. Both will be equipped with all the necessary apparatus. The office is 8 by 21 feet and the laboratory is 8 by 15 feet. Both have large air ports and each one has a skylight 3 feet square overhead, which will give excellent light for operative work.

The eye rooms consist of a general examining room which is 12 by 21 feet, a dark room for ophthalmoscopic examinations, which is 6 by 6 feet, and an operating room 11 by 12 feet for eye, ear, nose and throat operations. There is sufficient space here for installing all the necessary apparatus.

The small operating, cystoscopic and examining room is directly under the main operating room and is 15 by 18 feet. It will have one operating table and all other necessary apparatus and, in addition to its use for patients admitted to the ship, it will be very convenient and useful in examining and treating out-patients sent to the ship. It has two syklights, each 3 feet square, which will give excellent light and ventilation.

The X-ray room is just abaft the small operating room. It is 12 by 18 feet, and connected with it is a dark room 6 by 12 feet. The X-ray machine will be placed against the forward bulkhead next to the small operating room, so that wires can be run from the machine to tubes at the operating table, so that fluoroscopic examinations and even photographic plates can be made while the patient is undergoing operation. As the main operating room is just above, the wires could be extended to the operating tables up there and the fluoroscope used and plates taken. It is quite an advantage to have the X-ray machine near the operating room so that the fluoroscope can be used and plates taken, especially in fractures, dislocations, and gunshot wounds; but this is not a necessity. The X-ray room is placed as near the operating rooms in this ship as is practicable. In the dark room there will be a coil with brine circulating in it to cool the water used in developing photographic plates, and one of the cold rooms near the ice machines can be used for that purpose in very warm weather if necessary.

There is a 6-foot athwartship passage between frames 58 to 60, abaft of which come the executive's and officer of the day's office and the record office on the right and the bacteriological and chemical laboratory and the dispensary on the left, and between them a fore and aft passage and lobby with benches for patients and others

waiting their turns. The laboratory will be 16 by 18 feet and in one corner will have an incubator room 6 by 6 feet. In addition there will be a small cold room down near the ice machines to keep media, vaccines, and sera cool.

Next comes a board, examining, reception, and recreation room and library. It is 12 feet wide, 35 feet long, and extends from one side to the other of the deck house. This is a very necessary room, and the want of it is felt very keenly on other hospital ships of the Navy. Abaft of this is the pay office on the right and the general storekeeper's office and the commissary office on the left. Between these offices and the galleys is a 6-foot athwartship passage, into which open the two galleys and the food and baggage elevator. This elevator serves for all the messes of the ship and it is accompanied by stairways and ladders from the top to the bottom of the ship and is very convenient to the galleys.

The galleys and the bakery occupy the space around the fireroom uptake from frames 78 to 80. The officers' galley and the bakery are on the right side, and each is 12 by 15 feet. The crew's and patients' galley is on the left side of and abaft of the fireroom uptake, and occupies a space 12 feet wide by 42 feet long. There is ample space for the galleys. There will be larger ports and doors on each side of the galleys, and the bulkheads between the galleys and passage will be heavy wire mesh to afford good circulation of air. The ranges, boilers, and bake ovens will be grouped around the bulkheads of the fireroom uptake and a large hood will extend around three sides of the uptake over the ranges, boilers, and bake ovens. A vent in the top of the hood 1 foot wide and 15 feet long, extending up to the top of the uptake, will carry off the excess heat of the galleys and make them much more comfortable. Galleys should always be located around the fireroom uptake, as then the heat is concentrated in one place and can be carried off more easily by vents, and the galley smokestacks can be connected up to the ship's smokestack more readily, and there will not be so much wild heat distributed about the ship. From the bakery a passage leads aft to the commissary steward's stateroom and the junior officers' sick quarters. A mess-store issue room opens into the after part of the patients' and crew's galley.

The junior officers' sick quarters extend from frame 92 to 108 and comprise six staterooms each 9 by 12 feet, a room for two hospital corpsmen in attendance, pantry, toilet, and mess room, and a ward 12 by 33 feet with two wings 9 by 12 feet going out to the sides of the deck house and giving good through and through light and ventilation. In the forward and the after parts of the mess room four beds can be installed and curtained off so they will not interfere with the compartment as a mess room.

Between the junior officers' sick quarters and the warrant officers' sick quarters there is a 15-foot athwartship passage with two cargo hatches leading it below. In this passage will be installed two extension cranes with trolleys on them for hoisting patients aboard in stretchers.

The warrant officers' sick quarters extend from frame 113 to frame 127 and comprise six staterooms each 9 by 12 feet, a pantry, a room for hospital corpsmen in attendance, and a toilet and a mess room and ward in which four beds could be installed in the forward and after parts by curtaining them off, leaving sufficient room for messing. The mess room is 12 feet wide by 33 feet long and has two wings 6 by 12 feet extending out to each side of the deck house, giving through and through light and ventilation.

If it should be found desirable to put female nurses aboard this ship, either the junior officers' sick quarters or the warrant officers' sick quarters would have to be used for them. The first would probably be more comfortable, but the latter more private. Whether or not female nurses would be advantageous aboard a hospital ship intended for a long stay with the fleet is still problematical.

Abaft of the warrant officers' sick quarters is a mess and recreation room and pantry for venereal cases whose wards are on the deck just below, from which a ladder leads up to their mess room, which is 15 feet wide and 30 feet long. Abaft of this is the autopsy room, 12 by 18 feet, and then comes a disinfecting room, 9 by 18 feet, with a large steam disinfector opening into each of the rooms. The infected articles are put in on the left side, sterilized, and taken out on the right side. A ladder leads from the isolation wards down to the left door of the disinfecting room and then a chute leads from the right disinfecting room to the laundry. As this disinfector is outside and on the after part of the deck, infected articles from other ships can be easily brought aboard and disinfected without danger of infecting the ship. Abaft of the disinfecting room is the incinerator for burning garbage, trash, etc., It will be seen that the contagious and venereal cases, laboratory animals, autopsy room, disinfector, and incinerator are all on the after part of the ship and as far removed as possible from other patients and parts of the ship, so there will be a minimum of danger of infection spreading or of other disagreeable conditions arising therefrom. It will also be seen that the offices, laboratories, operating and examining rooms are centrally and conveniently located on this deck and are very accessible to each other and by ladders and elevator to the decks above and below.

Second or ward deck.—This is the first deck wholly within the hull of the ship and contains the principal wards. In the bow of the ship on this deck is the paint locker, abaft of which is the carpenter shop. Then come the messmen's quarters with 20 beds, abaft of which are the quarters of the petty officers of the seaman branch, including six

staterooms, each with two berths and a country between in which additional berths can be installed if necessary. In the forward part of this compartment are two blower rooms for ventilating purposes.

Between frames 26 and 76 are located the medical and surgical wards of the ship. Two wards are in the forward part and two in the after part and between them are all the adjunct rooms which serve the four wards. The forward wards are located between frames 26 and 39, and a longitudinal bulkhead down the center of the ship divides these spaces into the two wards. Just forward of them is a blower room for ventilation. The longitudinal bulkhead will have large openings or windows in it, which will afford through and through ventilation for the wards. There are large ports in the side of the ship for light and ventilation. Each ward has 32 beds and a quiet room attached with two beds.

The adjunct rooms of the wards are located between frames 39 and 55 and consist of the following rooms on each side from forward aft: An office for the surgeon and hospital corpsman in charge of the wards for keeping records, etc., a pantry and diet kitchen for serving special diets to patients, a large wash and toilet room, and a room for two hospital corpsmen in charge of the wards. In the forward part of this space is a large hatch with a lobby around it with ladders for communication with the decks above and below, which gives good natural ventilation to the space. Between the adjunct rooms mentioned are a hydrotherapeutic room, a thermotherapeutic room, and two dressing rooms. From frame 44 to frame 76 between the adjunct rooms and the after wards there runs a wide passage which gives communication fore and aft without the necessity of having to pass through the wards and other rooms and thus prevents their being used as gangways. There will be large doors and ports or windows in the walls of this passage, thus giving through-and-through ventilation to the wards. An elevator and ladders in this passage extending from the top deck down to the storerooms furnish easy communication from the wards to the decks above and below. The after wards, one on each side, contain 46 beds each and a quiet room with two beds. The two wards on the right side are for surgical cases and those on the left for medical and special cases.

Abaft of the wards is a 6-foot athwartship passage terminating at each end at a large port or door in the side of the ship, which leads out to the first landing of the gangway ladder, so patients and baggage can be brought into the ship on this deck rather than be taken to the deck above and then brought back. An elevator and a stairway are on the forward side of this passage, making it very convenient to transfer baggage to baggage rooms just below. From this passage to the general mess room a passage runs aft on each side of the fireroom and engine-room uptakes, between which are an engineer's storeroom and ladders leading down to the fireroom and engine room. On the right side of the ship are the chief petty officers' mess room,

five staterooms with two beds each for chief pharmacist's mates, two blower rooms, and a small storeroom. On the left side are the quarters for the mess stewards and cooks, two staterooms with two beds each for chief petty officers, two blower rooms, and two toilets, one for chief petty officers and one for the mess stewards and cooks. The general mess scullery is just abaft of the engine-room uptake and just forward of the general mess room.

The general mess room extends from frame 99 to frame 112 and the full width of the ship. It is therefore 39 feet wide by about 50 feet long. The right side is assigned to the Hospital Corps and the left to the deck and engine-room forces. Opening into the after part of the general mess room are four staterooms, two on each side for engineer petty officers. Two cargo hatches also open into the after part of this space.

The venereal wards and adjuncts extend from frame 115 to frame 132. A wide fore-and-aft passage runs between the wards. There are doors and large ports or windows in the walls of the passage for through-and-through ventilation to the wards. Each ward has 32 beds and the right ward has a quiet room with two beds and a room for two hospital corpsmen in charge. The left ward has a large dressing and treatment room attached and each ward has a toilet and wash room opening into the after part of it. In the passage is a hatch with a ladder leading down to the laundry, and there is a ladder leading up to the venereal mess and recreation room on the deck above. Abaft these wards are two blower rooms and the steering engine room.

Third or berth deck.—In the bow of this deck is a storeroom for paint connected by a hatch with the paint locker above. Abaft of it comes the chain locker and then a large space for a ship's storeroom. The seamen's quarters occupy the space from frames 18 to 31. In the forward part to the right is the wash room and to the left the toilet and a blower room is between the two. A large hatch gives access to these quarters which contain 40 beds and permit more to be installed, if necessary. There is a convalescent ward of 72 beds in the space from frame 31 to frame 47. On the right, forward, are two rooms for four hospital corpsmen on night duty. On the left side is a wash room and a toilet. A blower is located between the wash room and the hospital corpsmen's room. A large hatch gives ingress and egress to and from this compartment.

Abaft of this ward from frame 47 to frame 57 is located the convalescent patients' mess room. In the forward part are four strong rooms, two on each side, for the insane. Between them are four prison cells and a small toilet for the accommodation of the insane and the prisoners. Four feet in front of these rooms is a heavy wire mesh partition to prevent the escape of and to keep others from interfering with the inmates. In the afterpart of the compartment are

two rooms for the assistant masters at arms and two hospital corpsmen in charge of the compartment, a room for the canteen and another for the post office, and a pantry and a "lucky bag." An elevator and a ladder give access from above and below to this compartment. Abaft of this come the bag and hammock rooms for the storage of patients' baggage and a linen repair room. An elevator and a ladder give access to these rooms.

The boiler room is located between frames 76 and 86 and the upper platform of the engine room between frames 86 and 100. The machine shop and evaporators will probably be installed here. Abaft of the engine-room platform is a compartment containing the ice machines and dynamos, a butcher shop and a cold room for fruits, vegetables, eggs, butter, etc.

The quarters of the engineer force come next between frames 111 and 124. The compartment is divided into two by a fore and aft bulkhead down the center with large ports in it to give free circulation. Forward of each room is a toilet and wash room. Each room has 30 beds. Abaft of these quarters comes the laundry from frame 124 to frame 134. A dryer opens into the laundry through the after bulkhead and a steam disinfector also opens into it from a fumigating room just abaft the bulkhead. This fumigating room will be arranged so the ports can be opened up after fumigating without having to go into the room and the gases be forced out by blowers. The most modern machinery will be installed in the laundry.

Platform or storeroom deck.—In the bow is a trimming tank abaft of which comes the chain locker and then a space for ships' stores.

Abaft of this from frame 18 to frame 31 are other ships' storerooms, and abaft of these from frame 31 to frame 47 come the reserve medical storerooms. The foregoing storerooms are reached through cargo hatches from above. The reserve medical stores will be generally kept in the original boxes and packages for issue to other ships in emergencies as needed.

The ships' medical storerooms are located on this deck between frames 47 and 66. The elevator and a ladder come down into a handling room between these storerooms. The medical stores in these rooms will be unpacked and placed on shelves ready for the immediate use of the ship. In installing shelves or bins for stowing medicines, provisions, or other stores, it is best, when practicable, to have them run athwartship, as the sides and supports of the shelves act as stays for the articles and prevent them from falling out when the ship is rolling in rough weather, and battens do not have to be put up in front to prevent this as is the case if the shelves are fore and aft. The storerooms will be inclosed with heavy wire mesh screen to permit better circulation and so the condition of the room and contents can be seen at inspection without the necessity of having to open the door and go inside.

Abaft the medical storerooms come some tanks for either fuel oil or fresh water. Two baggage rooms come next, abaft of which come the boiler room and the engine room between frames 76 and 100. The cold-storage rooms occupy the space between frames 100 and 111 and are just under the space occupied by the ice machines. There are eight rooms, four of them quite large, two of them medium sized, and two of them small for the use of officers' messes. There are two air locks, each of which serves four rooms. Between the air locks is a small room for keeping media, vaccines, and sera for the laboratory. A large hatch coming down into the handling room affords access to the cold-storage room. Abaft of the cold-storage room come the commissary rooms. A large hatch leads down into the handling room between the storerooms and affords access to them. Abaft of the commissary storeroom is a space for ship's stores and then the after trimming tank.

Hold.—The hold has trimming tanks forward and then No. 1 and 2 holds for ship's stores and No. 3 hold for heavy and bulky medical stores. Abaft of this are two fresh-water tanks and between them a compartment for the installation of the apparatus for the vacuum cleaning system with which the ship should be equipped. Abaft of these are situated the fuel-oil tanks between frames 47 and 75. There are 28 separate tanks in this space, which is surrounded on all sides by cofferdams. Next are the boiler and engine rooms between frames 76 and 100. Then follow the morgue, shaft alleys, and storerooms or ballast tanks, and Nos. 4, 5, and 6 holds in succession, and finally the after trimming tank.

There are 13 water-tight compartments in this ship. There are water-tight bulkheads at frames Nos. 5, 11, 18, 31, 47, 65, 76, 86, 100, 111, 124, and 134. These water-tight bulkheals extend clear up to the second or ward deck, which is about 10 feet above the water line. This should give a very good margin of safety; but as there is no direct communication on the third or berth deck, which is 2 feet above the water line, communication on that deck will be very inconvenient. It is suggested that a perfectly water-tight door might be cut in each of the following bulkheads on that deck, namely: Between the boiler room and upper platform of the engine room and between this and the ice machine and dynamo room and between this and the engineer forces' quarters. These doors could be closed and locked at sea and be perfectly safe; but could be opened in port and would be of great value and convenience to the engineer force as most of the time is spent in port.

From the first or main deck down all hatches must be water-tight and kept closed at sea whenever practicable or necessary. Hatches on the forecastle deck must be water-tight and kept closed at sea. As the hatches are the only means of ingress and egress below the

ward deck and have to be kept open or opened at sea, they should be made so they can be easily opened and closed. The elevator shafts should have water-tight doors on every deck from the main deck down. In the after hatches of the ship, freight platforms might be installed, which could be loaded in the holds and hooked on to falls attached to the after winches and hoisted.

Vegetable lockers should be installed on the superstructure just forward of the isolation ward. In cold weather the vegetables can be put below in No. 5 hold under the commissary storerooms. Artificial ventilation above the ward deck will not be necessary as the natural ventilation, supplemented by electric fans, will be sufficient. There should be good artificial ventilation on the ward deck and all below. The supply system of ventilation is best; but all toilets below deck should have both the supply and exhaust systems.

For internal communication the ship should have a complete system of bells, telephones, etc. There should be a scuttle butt in the general mess room, one in the lobby around the large hatch between the medical and surgical wards, and one in the patients' recreation room. It is probable that the water in these could be kept cool by the circulation of brine more economically and easily than by using cold air from the ice machine.

BERTHING CAPACITY.

The berthing accommodations for the personnel of the ship will be as follows:

Officers and crew.

	Medical department.	Deck and engineer departments.
Officers	11	13
Chief petty officers	14	22
Hospital Corps	90	.....
Seaman branch	.....	40
Engineer force	.....	60
Stewards, cooks, and messmen	30	10
Total	145	145

Patients.

Commissioned officers	18	
Warrant officers, enlisted men	10	
		28
Surgical ward	82	
Medical and special wards	86	
Convalescents' ward	72	
Venereal wards	66	
Isolation wards	66	
		372
Total		400

In addition to this number of permanent beds, in case of emergency, there can be installed in the mess rooms, recreation rooms, etc., at least 100 cots or Gosso beds for temporary use by convalescents or the slightly sick or injured. The Gosso beds, which have been installed on some of the hospital ships of the Navy, do very well for temporary use in emergencies, but they should not be employed as permanent beds in the regular wards of the ship.

On account of the lack of space on board ship, it is not possible to provide as much deck space and air space in the rooms and wards as for patients in hospitals and elsewhere on shore, and even the minimum of 15 cubic meters of air space per man can not be provided. This lack of air space on board, however, can be compensated for by artificial ventilation which can change the air in the compartments as often per hour as may be desired or necessary. It will not be necessary to have artificial ventilating systems above the ward deck, as with large ports and electric fans on the upper decks sufficient ventilation can be obtained. The officers' and chief petty officers' staterooms contain from 600 to 800 cubic feet of air and will have sufficient air space with the good ventilation they have. All the sick officers' rooms will have 800 cubic feet or more per man which will be sufficient with the good ventilation afforded them.

In the wards and berthing spaces there will be much less cubic air space per man, but they will have good artificial ventilation and the circulation is generally better in large compartments than in small ones. The wards and berthing spaces will have approximately the following dimensions and deck areas and cubic air space, and deck space and air space per man when the berths are superimposed and the wards filled to capacity, which will probably not happen often and then only for short periods:

Each of the two forward wards on the ward deck is 25 by 39 feet and has 975 square feet of deck and 7,800 cubic feet, giving 28 square feet of deck space and 230 cubic feet of air space per patient.

Each of the after wards is 24 by 63 feet and has 1,512 square feet of deck and 12,000 cubic feet, giving 30 square feet of deck space and 250 cubic feet of air space per patient.

The convalescent ward on the berth deck is 39 by 53 feet, has 2,067 square feet of deck and 16,540 cubic feet, giving about 28 square feet of deck space and 230 cubic feet of air space per patient.

Each of the venereal wards is 22 by 42 feet and has 924 square feet of deck, 7,390 cubic feet, giving 28 square feet of deck space and 230 cubic feet of air space per patient.

The six isolation wards combined are 31 by 48 feet and have 1,488 square feet of deck and 12,000 cubic feet, giving 25 square feet of deck space and 200 cubic feet of air space per patient. These wards have not as much air space per man as the other wards, but they are

high above water and have much better natural light and ventilation. Besides, the great majority of these patients are up and about and will spend most of their time on deck in the open air in good weather.

When the ship is not filled to more than half its capacity, which will be most of the time, there will be no necessity for having superimposed berths in the wards and the deck space and air space per patient will be doubled, giving each from 50 to 60 square feet of deck space and from 400 to 500 cubic feet of air space. The wards of the ship will accommodate 220 patients without having superimposed berths and this number would be entirely sufficient for ordinary times.

Berthing spaces of the crew have approximately the following capacities.

The Hospital Corps quarters are 36 by 44 feet and have 1,584 square feet of deck and 12,700 cubic feet, giving 24 square feet of deck space and 190 cubic feet of air space per man. This compartment is high above the water and has excellent natural ventilation.

The seaman's quarters on the berth deck are 30 by 48 feet and have 1,440 square feet of deck and 11,500 cubic feet, giving 36 square feet of deck space and 288 cubic feet of air space per man.

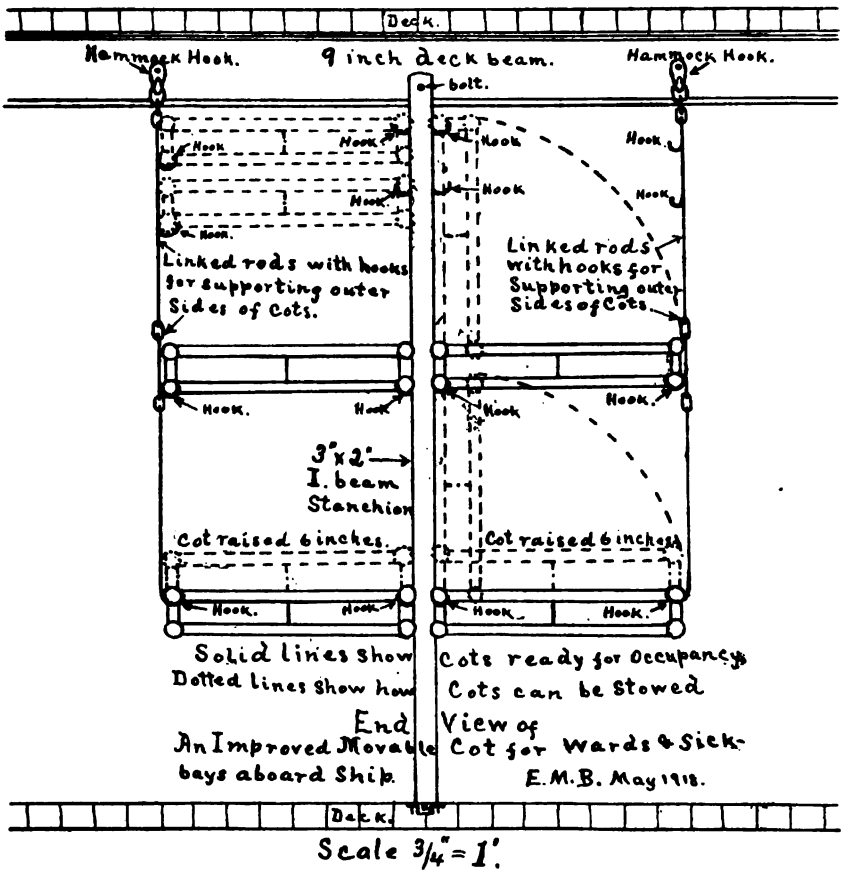
The messmen's quarters are 21 by 36 feet and have 756 square feet of deck and 6,000 cubic feet, giving 37 square feet of deck space and 300 cubic feet of air space per man.

The quarters of the engineer force are each 24 by 30 feet and have 720 square feet of deck and 5,760 cubic feet, giving about 24 square feet of deck space and 200 cubic feet of air space per man.

For the berthing of patients and crew it is proposed to use ordinary pipe-framed cots, 6½ feet long by 30 inches wide and 6 inches deep, with wire-mesh bottoms with springs at each end. These cots should be perfectly plain with no attachments except the spring bottoms and not permanently fastened to anything, so they can be moved about anywhere in the ward or ship. For the better installation of these cots the frames of the ship are placed 3 feet apart, so that a stanchion can be secured to every other frame to support the cots and avoid the necessity of having special attachments to the deck overhead to support them. A pair of stanchions will support four cots, one above and one below on each side. The stanchions will be 3 by 2 inch I beams, secured to the deck beams above by removable bolts and to the deck below by tenons that fit into mortised deck plates. Thus there will be only two obstructions on deck to collect dirt and interfere with cleaning instead of six obstructions with other kind of support. Broad flat hooks will be riveted to each side of the I beam at 20 and 52 inches above the deck to receive and support the pipes of the frames of the cots on one side, while the other side will be supported by chaims or rods suspended from

the deck beams above. The accompanying drawings illustrate the working of these cots very well.

The advantage of these cots is that they and the stanchions are portable and patients can be moved about the wards or ship without being taken out of their cots, and the cots can be folded against the stanchions or stored overhead or taken out of the walls and stored below. They can also be made into swinging cots if desired by suspending them from hooks on the overhead deck beams. When the

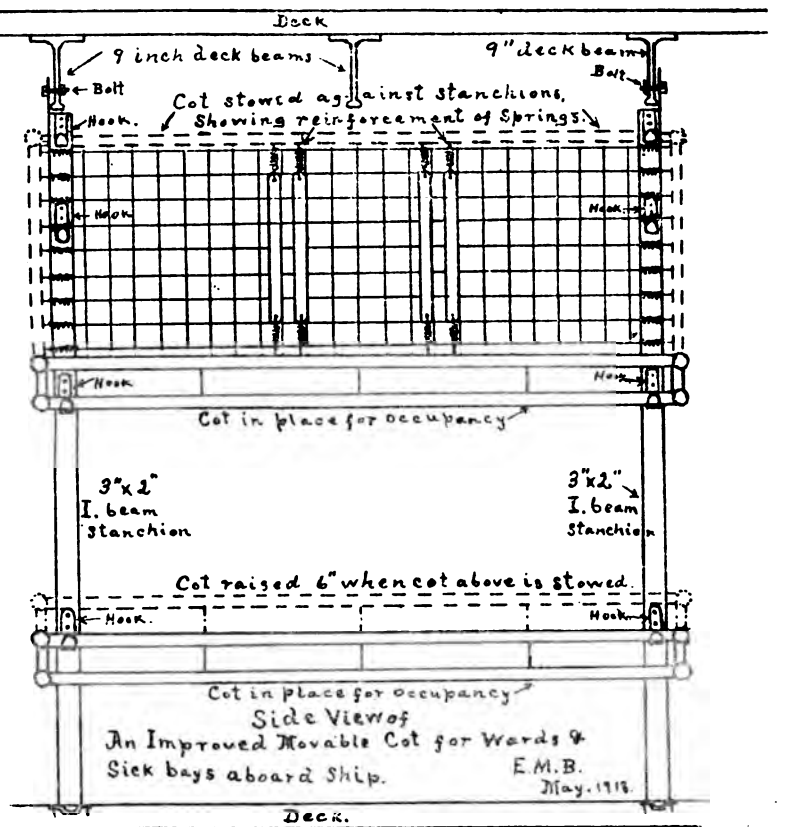

Deck.
Hammock Hook.
9 inch deck beam.
bolt.
Hammock Hook.
Hook.
Linked rods with hooks for supporting outer Sides of Cots.
Linked rods with hooks for Supporting outer Sides of Cots.
3"x2" I. beam Stanchion
Cot raised 6 inches.
Cot raised 6 inches.
Solid lines show
Dotted lines show how
Cots ready for Occupancy
Cots can be Stowed
End View of
An Improved Movable Cot for Wards & Sick-bays aboard Ship.
E.M.B. May 1918.
Deck.
Scale 3/4" = 1'.

overhead cot is not being used it can be folded or stored under the deck beam or in the hold below. The lower cot then will be much more convenient for attending to the patient and can be raised or lowered to any height desired.

It has been noticed that the bottom of the standard cots of the Navy sag a great deal, which makes them very uncomfortable for patients. To obviate this, it would be well to reinforce the bottom from side to side with supports with stout springs at each end fastened to the bottom pipes. Two supports should be placed so they

would come between the sacrum and shoulder blades and two between the sacrum and knees, as they would give more support to those parts and would not put so much weight on the sacrum, which is so prone to have bedsores from pressure and this would probably give the patient much comfort. The accompanying diagram illustrates this feature of the cot.

There are many details in the construction of a hospital ship which will require the constant supervision of a medical officer of experi-



Scale 3/4" = 1'.

ence and familiarity with the requirements to see that they are properly carried out; for no matter how proficient the naval constructor may be there are many things bearing on the needs of the medical department that he does not understand and he can not view them from the same standpoint and appreciate what is a necessity as the medical officer does. Therefore a medical officer or as many as are necessary should be detailed to confer and advise with the constructors and see that the intentions and ideas of the Bureau of Medicine and Surgery are carried out from the time the plans are begun until the ship is finished and completely equipped.

NORMAL HEARING.

By G. B. Trible, Surgeon, United States Navy.

The proposed large increase in the personnel of the Navy brings the question of physical qualifications to the fore. One of the most fruitful subjects for controversy has been the necessary hearing requirements, particularly for entrance to the Naval Academy. Every year has seen its percentage of rejections, its percentage of belated acceptances who have taken treatment and reached the required minimum, and who later for the most part were found below normal. The absence of a definite standard for hearing widely accepted and capable of being easily interpreted has caused much more confusion than is the case with vision. It is undoubtedly a fact that *any standard that causes rejection will be criticized by those affected* but it is only fair, in the interests of the Government and of the individual, to avoid an unduly high percentage of rejections, unless the acceptance of such cases would immediately jeopardize the best interests of the service, or later cause an excessive number of retirements in the early years of service. Because the enlisted personnel is constantly changing while the officers are permanent, it is necessary that the requirements in the case of the officers, particularly those of the line, should be higher than those maintained for the enlisted service. Conditions during war, when many temporary appointments are made, approximate to the situation existing with the enlisted force, and such exacting standards need not be required.

In addition to more or less desultory observation extending over several years, this matter was taken up at length during two tours of temporary duty at the Naval Academy, and the reports of the results found and the conclusions drawn will be quoted at length in this article.

"In order to determine the normal hearing and to establish the Naval Academy standard, or, putting it another way, to standardize the tests, 208 midshipmen selected from the four classes in approximately equal numbers, were tested according to the following schedule:

Name.	Otoscope.	Bone.	Watch.	Acoumeter.	Whispered voice.	Conversational voice.	Tuning fork.
.....	.....	.....	.....	.....	.....	.....	.....

"Four hundred, and sixteen ears were thus tested, using the Trenton-Ingersoll watch, Politzer's acoumeter, whispered voice (residual air only), spoken voice, etc., making use of the medical examining board room where the candidates for entrance and midshipmen during semiannual examinations are all examined. The results are

highly instructive; the watch showed the greatest variation, while the acoumeter was practically uniform between 60 and 70 feet. Whispered voice ranged between 25 and 35 feet, with a few candidates hearing at 40 and 45, the majority, however, only at 30 to 33 feet, the length of the large board room. Spoken voice (conversational tones) was heard about 70 feet, the space not permitting a test at the full distance. The figures for the watch are given in detail. There were but 19 ears below 5 feet (60 inches), and only three below 3 feet (36 inches). It can be seen that present requirements, namely, 40 inches for entrance, and 20 inches for continuance, are inadequate, and must allow a number to enter who are not normal, and it is suggested that 60 inches for entrance would be the lowest normal measurement, while 30 inches for continuance would not cause the rejection of any normal case. Temporary defects caused by coryzas, ingestion of drugs (quinine for instance), can be excluded by reexamination after the lapse of suitable time. With space permitting, as it does at the academy, the acoumeter is much more satisfactory and less apt to give varying results. In addition, this test is frequently used by civilian specialists, while the watch test is not. However, the value of the watch, if properly standardized by a series of 50 cases for example, must be recognized, though for diagnostic purposes it is of no assistance, except in a general way as an easy and simple method of making sound. The present whispered voice test, with 15 feet accepted as normal distance, is ridiculously low; in fact, is very misleading since defective cases being aware of their condition and realizing the importance of making a good showing, pay strict attention to whispered voice, and it has been rare to find one who could not hear whispered voice 15 feet. Not alone is this true, but cases known to possess but little hearing when compared to the normal have exceeded those who had good hearing, the one case paying strict attention, and the other not. The normal hearing for whispered voice is around 20 meters, under good conditions, in a large room with absolute quiet. Under conditions existing at the Academy, 25 feet as a minimum would not exclude any normal candidate, and would remove the present discrepancies. Use of the various tuning forks, except as diagnostic measures as in the Weber, Rinne, Schwabach, or Bing tests, or to try out the extreme low tones, is impracticable. But little dependence can be placed in the statements regarding the length of time the fork is heard. Finally the examiner becomes exhausted and the candidate confused, and in a test where duration of hearing is measured in seconds, the result obtained can not be highly edifying. The otoscopic examination is of supreme importance and should be done with a magnifying otoscope of the De Zeng or similar type, with the Siegel pneumatic attachment. in order to observe the mobility of the drum and to aid

in the discovery of old perforations or atrophic areas. Some of the scars are as thin as tissue paper, and their independent movement on alternate rarefaction and condensation is very striking and can not be overlooked."

Results of hearing tests—Trenton-Ingersoll watch.

	Right ear.	Left ear.	Total.
Under 2 feet	0	0	0
2 feet	2	1	3
3 feet	4	6	10
4 feet	2	4	6
5 feet	20	13	33
6 feet	21	23	44
7 feet	15	15	30
8 feet	17	17	34
9 feet	11	10	21
10 feet	35	33	68
11 feet	2	0	2
12 feet	22	22	44
13 feet	7	6	13
14 feet	6	4	10
15 feet	31	37	68
16 feet	0	1	1
17 feet	2	1	3
18 feet	5	4	9
19 feet	0	0	0
20 feet	6	11	17
Total	208	208	416

Nineteen, or 4.6 per cent, below 60 inches. In many cases better ear was much more, or the condition might have been temporary, or beginning disease.

A number of cases had been held over for final action, and a brief outline of their history and condition is given. These cases found defective were practically all due to various catarrhal conditions, actual injury from gunfire, swimming, or other causes being exceedingly rare, as shown by the following table:

Name.	Class.	Defect.	Origin.	
			Prior to appointment.	After appointment.
B. T. W.	Fourth	Defective hearing (diagnosis doubtful).	Temporary, on entrance.	
C. J. J.	Third	Defective hearing; catarrhal otitis media.	.....	Probably following swimming, after 1 year.
C. C.	First	.....do.....	Defect noted on entrance; considered temporary.	
C. C. R.	Second	Defective hearing	Defective hearing noted on entrance.	

Name.	Class.	Defect.	Origin.	
			Prior to appointment.	After appointment.
F. P. K.....	Third...	Defective hearing; catarrhal otitis media.	Temporarily, on entrance.	
G. J. F. W..	First....	.....do.....	Defective hearing..	
H. S. A....	...do....	Defective hearing; middle ear disease (diagnosis in doubt).	.....	Developed rapidly after more than 2 years at the academy.
H. A. W....	Fourth..	Catarrhal otitis media.	Noted on entrance..	
H. A. L....	Second.	.....do.....	Noted on entrance (reappointment).	
H. E. G.....	...do....	.....do.....	.....	1 year after appointment.
H. W. H...	Third...	Defective hearing; internal ear involvement.	.....	Probably complication or sequel of pleurisy, with effusion; not noted before that time and now very markedly deaf.
H. J. H....	Fourth..	Catarrhal otitis media.	Entrance; temporary; later examination, passed.	
McK. W. A.	First....	.....do.....	.....	During first year.
McC. E. F..	Third...	.....do.....	.....	Do.
M. A. C.....	First....	.....do.....	.....	Do.
M. E. W....	Second..	.....do.....	Entrance; defect considered temporary.	
P. J.....	First....	.....do.....	.....	Developed during second year.
P. A. J.....	Second..	.....do.....	Entrance; considered temporary.	
R. F. D....	...do....	.....do.....	.....do.....	
R. G. E....	...do....	.....do.....	Defective hearing noted on entrance.	
S. G. B.....	...do....	Defective hearing; internal ear involvement.	.....do.....	
V. J. A.....	First....	Catarrhal otitis media.	.....	During second year.
W. J. N.....	Second..	.....do.....	.....	After second year.
W. E. A....	Fourth..	Involvement of both middle and internal ears.	.....	During first year.
W. R., jr....	...do....	Catarrhal otitis media.	Entrance.....	

Continuing the work commenced in 1915, during the last part of 1916 further studies were made and a report submitted, part of which is quoted.

"The question of defective hearing is one of the greatest importance and one which has caused nearly as much trouble among the student body as that of defective vision. Certainly it has been a greater source of annoyance and has given rise to more controversy upon the

examination for entrance than the visual requirements. This is due in part to a lack of definite agreement among otologists as to just what constitutes a normal ear, and what variations can be accepted without jeopardizing the efficiency of the Navy personnel later, when those presenting such variations are in positions of responsibility. Unfortunately, there is no easily ascertained standard, such as exists in the field of ophthalmology where the vision of 20/20, for instance, is accepted practically throughout the world, as a condition approximately normal, though latent errors of refraction may exist."

The question of avoiding a high percentage of early retirements, due to preventable causes, must be taken into consideration. In a recent confidential report from the British Admiralty, it was stated that the deleterious effects of gunfire and shell explosion are much intensified in those in whom diseased conditions of the ear were present, so that the effects of explosives could only be taken as aggravating factors and not as primarily causative factors in the production of deafnesss or ruptured drum. Unfortunately, no method of ear protection yet devised is satisfactory. The experience of the British in their naval battles shows that, taken all in all, mere cotton pledgets placed in the external canal are as efficient as any other means of protection. All these points must be taken into consideration in selecting and maintaining a standard of hearing for entrance. A vast deal of criticism is bound to be attached to any standard which causes a certain number of rejections, since the rejected applicants naturally wishing to bolster up their cause, or considering that they have a justifiable grievance will be prone to indulge in a certain amount of exaggeration, whether consciously or unconsciously. Civilian specialists consulted later may in some instances fail to find the condition present which was reported by the naval examiner. Possibly this may occur, because it was merely temporary, but again, if the defect be found, it may be considered of slight import. It is a fact that no one can predict the ultimate outcome of any one case, but long experience has proved that those showing slight defects of hearing make for an unfavorable prognosis under the climatic conditions prevailing at Annapolis, and those showing slight abnormalities on entrance, which have been presumably of a temporary nature and have been waived upon reexamination, furnish a great percentage of all the cases later rejected at the semiannual examinations.

In order to obtain the present-day opinion among otologists, and endeavoring to secure the cooperation of the leading members of the profession in that speciality, in conjunction with the members of the medical staff of the Academy, a questionnaire was prepared and sent to the American Otological Society, a copy of which is appended. Copies of the replies received, except a few mere perfunctory

acknowledgments, are appended. It can be seen from a consideration of these letters that no standardhas yet received general acceptance, nor is any one particular system or routine of examination or practice carried out by these prominent specialists. Very few can be found who place much reliance upon the watch test, nor do the members of the medical staff of the Academy, except as a ready method of measuring the acuity of the hearing. Thus the Trenton-Ingersoll watch has been so standardized by hundreds of tests that except in rare instances no one with a normal ear should fail to hear this watch above 60 inches. In those who are older this does not hold, nor in the case of the enlisted personnel, especially those drawn from industrial pursuits. However, in order to obtain the cooperation of the profession at large, and to avoid the appearance of undue tenacity in upholding a standard no longer accepted by the majority, it is recommended that the assistance of the subcommittee of otolaryngology of the medical section of the Council of National Defense be invoked. It may be possible in this way to obtain suggestions for a standard acceptable for both the Military and Naval Academies, and one which will be recognized by otologists at large, and free the medical examining board and the Bureau of Medicine and Surgery from much controversy. The necessity for a higher standard of hearing in the case of candidates for the Academy in contradistinction to those wishing to enlist, or even enter one of the staff corps, is apparent. In the case of midshipmen very little productive labor is performed until after five years' education, during which time they have received pay, been educated at Government expense, and then become eligible for retirement at three-quarters of the highest sea pay. In the case of the staff corps the expense of education was borne by the individual, the natural selective processes have had full play during the period of his college or professional training, and he is able in a shorter time to render service. With the enlisted personnel very few enter with the idea of making the Navy the field of their life work, and each and all are ready for duty nearly immediately, the pay is proportionately small, and the disability pension correspondingly low. It should not be impossible with the millions to draw from in this country to secure men physically qualified in all particulars, willing and able to enter the Academy. Very few actual cases develop at the Academy due to anything done or undergone as a part of the academic course. Every year a case or two of ruptured drum occurs from athletics in some form or another, but the main trouble is a sequel of catarrhal processes from the numerous cases of influenza or similar diseases of the upper respiratory tract. Naturally most of this is due to climatic influences and the mere presence of a large number of youths in a comparatively small space. This is unavoidable, and

doubtless occurs at all other institutions of learning where a dormitory system prevails and large classes are the rule.

It can be readily seen that a satisfactory standard is going to be extremely difficult to obtain, and it is rather interesting to note that with all the criticism that has been directed against the watch test, this test has been retained in the Army Aviation Service, presumably meeting the approval of the many distinguished specialists in the Medical Reserve Corps of the Army. The great difficulty with the watch test is to tell whether or not the candidate or applicant hears when he says he does. The benefit of the doubt always must be given to the candidate. The acoumeter is much preferable where sufficient space exists. More extended experience and careful consideration of the suggestions made by Dr. Randall regarding the use of tuning forks in quantitative estimation of the hearing power have not changed the opinion expressed in the first part of this article. It is not believed that they are suitable for this purpose, except to measure the high and low tone limits. It is a fact that the British service uses the difference between the air and bone conduction as standard, as noted below.

Hearing tests as carried out in a large naval hospital. Average condition in health.

Fork.....128.....	AC>BC..... +35″H	AC>BC (H=Healthy). +35″H
Speech.....	1.....	1.....
Whisper.....	1.....	1.....

NOTE.—A fork of 128 vibrations is the best for all general purposes. AC=Aural conduction; BC=Bone conduction. AC should be heard for a longer time than BC, by about 35 seconds. H=Healthy.

Speech and whisper are reckoned as 1 in a healthy person, and any diminution is expressed in fractions of 1.

Words suggested for use in speech and whisper.

Right ear.	Left ear.
1. Flour.	1. Sal.
2. Floor.	2. Sale.
3. Four.	3. Sarl.
4. Flier.	4. Sell.
5. Flewer.	5. Seal.
6. Fleer.	6. Sil.
7. Flayer.	7. Syle.
8. Flow-er.	8. Sol.
	9. Soil.
	10. Soul.

Expressions are used suitable to the class of work in which the patient is engaged. Thus: "Close up, gun's crew," etc.

Again, in testing with figures it is a good plan to use the figures 5 and 9, as they are constantly mistaken for each other, as is the case with the letters "F" and "L" and "S."

Suggestions as to amount of hearing essential for the proper performance of the duties enumerated below.

1. Signal staff:

BC must be healthy (H) on both sides.

AC must be greater than BC by at least 10 seconds.

Thus	AC>BC +10′H		AC>BC +10′H
Speech	¾	¾	
Whisper	¾	¾	

2. Telephone operators:

There must be no discharge; no tinnitus.

	AC>BC +20′H		AC>BC +20′H
Speech	1	1	
Whisper	1	1	

3. Stokers:

If paracusis Willisii be present, it will tend to increasing hearing.

There must be no tinnitus; no vertigo.

A.....with hearing in one ear nil....then			
	AC>BC +20′H	AC>BC +20′H	(Healthy ear.)
Speech	¾	¾	
Whisper	¾	¾	
B.....with hearing in one ear.	¾...then		(Healthy ear.)
	AC>BC +10′H	AC>BC +10′H	
Speech	¾	¾	
Whisper	¾	¾	

4. E. R. A'S and engine-room staffs.

There must be no tinnitus.

	AC>BC +20′H	AC>BC +20′H
Speech	¾	¾
Whisper	¾	¾

5. Gunners:

A. Sight setters	AC>BC +20′ H	AC>BC +20′H
Speech	1	1
Whisper	1	1

B. Remainder of gun's crew	AC>BC +10′ H	AC>BC +10′ H
Speech	¾	¾
Whisper	¾	¾

6. The man at the wheel	AC>BC +20′ H	AC>BC +20′ H
Speech	1	1
Whisper	1	1

So much depends on the individual affected, his character, zeal, and aptitude, that the above remarks should be considered as suggestions only, and not in any way as definite rules."

Up to June 19, 1917, 423 candidates for the present fourth-year class were examined by the permanent medical examining board, and of these the rejections were as follows:

"Defective hearing, 41; defective vision, 20; color-blind, 8; poor physique, 4; varicosities (to be accepted after operation), 4; enlarged tonsils, 3; hydrocele, 2; deficient teeth, 2; extreme malocclusion, 2; flat feet, 1; hammer toes, 1; hernia, 1; hemorrhoids, 1; curvature of spine, 1; intermittent heart, 1; undescended testicle, 1; perforation of ear drum, 1; perforation of nasal septum, 1; deformity of elbow, 1; ulcer on fauces, chronic pharyngitis, and cervical adenitis, 1."

"Special attention was paid to the examination of the ears of the candidates, as defective hearing is always the cause of the greatest number of rejections, and deafness being a progressive and pensionable disability, it behooves us to be most careful that the hearing on entrance reaches the minimum standard required, which is, as we know from experience, very low. A record of this examination shows 301 candidates heard the watch tick from 60 to 120 inches, 81 from 40 to 60 inches, and 41 failed to hear at 40, the minimum standard." (Letter from Medical Director A. M. D. McCormick, United States Navy, June 19, 1917.)

UNITED STATES NAVAL ACADEMY,
MEDICAL DEPARTMENT,
Annapolis, Md., October 31, 1916.

DEAR DOCTOR: In connection with my present duty as specialist at the Naval Academy and from my previous duties here and at Washington, it has become evident to me that some differences of opinion exist as to what constitutes the normal ear. The lines of treatment followed and the results expected in the various diseased conditions also seem to vary considerably. Will you be kind enough to answer the following questions, that I may have the benefit of your experience?

While this is purely unofficial and the replies will be requested from all members of the American Otological Society and other otologists, answers to these questions will not only be a great favor to me but will be appreciated by the entire medical staff, and copies will be filed for reference, and may result in saving valuable men to the service.

1. What stress do you place upon the so-called retracted drum?

2. What importance do you place upon the watch as a ready means of gauging hearing? What watch do you use, and what is the distance that, from your experience, you have determined to be normal?

3. What stress do you place on the acoumeter, Politzer type? Do you use any other type?

4. What method of testing quantitatively by tuning forks do you employ, what are the forks used, and what length of time do you consider normal for the respective forks?

5. Do you consider breaks or gaps for higher tones, using Galton's whistle, of import in the young (16–25 years of age)?

6. What do you consider normal for the whispered voice, using numbers and residual air? Do you use conversational voice? What distance do you consider normal?

7. What other methods do you employ and what is their relative importance in your experience?

8. After the removal of obstructions, deflected septa, adenoid hypertrophy, large tonsils, etc., in what percentage of cases does the hearing return to normal in the chronic catarrhal otitis media cases? How soon after operations and how permanent is the improvement?

9. What effect has instillation through the Eustachian catheter into the middle ear had in your work and do you use it in catarrhal cases? In suppurative cases? And what remedies?

10. What treatment do you consider best, if any, in cases showing impaired hearing but no objective signs, so far as the drum membranes and tubes are concerned and no impairment of high tones (probably incipient otosclerosis)?

11. In chronic catarrhal otitis media, in a hypothetical case, subject to duty at sea, and under considerable nervous strain, exposed to rapid changes of temperature, and in the midst of constant noise, with added deleterious effects of gunfire, what is the probable prognosis; that is, length of time workable hearing will be retained (usually without treatment)?

The medical examining board is frequently confronted by cases giving a history of defective hearing and who have, in a number of instances, been under treatment and care of prominent otologists and who present letters stating that at the time last examined (usually within a week or two) their hearing had reached a certain acuity, sufficient to meet the required standard. Upon examination by members of the board under extremely good conditions, so far as eliminating extraneous sounds is concerned, it has been found that the hearing is much below that given by the examiner. The question is, Just how much permanency is usual in these cases after treatment?

It has been our experience that under existing service conditions they often deteriorate. It is not that these cases are not able to perform duty for a certain period, but the question of early retirement, inability to perform sea duty, etc., complicate matters. An expression of opinion along these lines will be appreciated.

Thanking you, I beg to remain,

Yours, fraternally,

G. B. Trible,

Passed Assistant Surgeon, United States Navy.

Salient points only from selected replies will be given. Dr. William C. Braislin, of Brooklyn, states in reply to question No. 2: "Any watch test, to be useful, must be tested on several normal ears and the distances heard by them ascertained." In reply to No. 3, he states: "Politzer is the standard." To No. 4, "Forks are chiefly useful in differentiating between lesions of the sound-conducting and sound-perceiving apparatus." And to No. 5, "Yes; they indicate incurable defects in the auditory centers."

Dr. Clarence J. Blake, of Boston, says that he uses a tuning fork, 512 v. s. (physical C), of 60 seconds' normal audible duration aerially; also the Politzer ticking acoumeter, and in addition the spoken and whispered voice at distances, respectively, of about 60 and 35 feet.

Dr. Ralph Butler, of Philadelphia, rarely uses the watch and has not used the acoumeter for years and does not consider it necessary if a series of forks and the Galton whistle are used. He uses a series of forks and calculates the hearing from the distance rather than the duration.

Dr. Bishop Canfield, of Michigan, places "no importance whatever upon the watch or the acoumeter tests," but tests quantitatively with forks as follows: "I note the number of seconds during which the observer with normal ear hears the tuning fork after the patient no longer hears it. Or, as in the Rinné test, when negative, note how long the ear with an increased bone conduction hears it after the normal ear no longer hears it. For quantitative test I use the 128th-256th and 4,096 vibration forks. I have tested these forks on a considerable number of normal persons and have in this way learned the duration of my particular set of forks. As different forks of the same pitch vary considerably in intensity and duration during which they can be heard, I find it necessary to test out each separate set of forks in this way. Consequently I know of no normal for the respective forks." The following little schedule is used:

Date, ...

R.		Voice.	L.	
b	a	Whis.	b	a
—	—	W.	—	—
—	—	R.	—	—
b	a		b	a
—	—	Sch.	—	—
—	—	C.	—	—
—	—	c^4	—	—
—	—	Watch.	—	—
—	—	Tin.	—	—
—	—	Tube.	—	—

He considers "21 feet normal for the whispered voice, using residual air, and for the conversational voice, residual air, 35 to 40 feet."

Dr. E. B. Dench, of New York, states that the watch is the worst test he has had for hearing. Personally he uses the ordinary dollar watch the normal hearing for which is about 50 inches. He does not use the Politzer, or any other type of acoumeter, nor the tuning forks for quantitative tests, but only for qualitative tests, and regards the Galton whistle as a valuable instrument. He considers the normal ear will hear the whispered voice, residual air, using numbers of two figures, at about 40 to 50 feet. The conversational voice will be heard without difficulty at about 75 feet, and determines the lower tone limit by the Bezold series of tuning forks, and the upper tone limit by the Galton whistle.

Dr. Percy Fridenberg, of New York, states that the watch is useful only as a standard of comparison in noting change of hearing from one visit to another, and the acoumeter, the same as the watch. He uses the entire range of tuning forks C to C–5. The whispered voice, ranging from 20 to 40 feet, and the conversational voice, 70 to 100.

Dr. Louis K. Guggenheim, of St. Louis, never uses the watch for testing hearing but uses the whispered voice, conversational voice (with and without the noise apparatus) and different tuning forks. He considers 8 to 10 meters normal for whisper with residual air. Conversational voice is used when the whispered voice is not heard.

Dr. Thomas J. Harris, of New York, states in reply to No. 2: "None." And to No. 3, "Of assistance in connection with the voice test," and to No. 4, "Yes." "The Dench-Bezold, C–64 fork in connection with the Hartmann Ton-Reihe." And in reply to No. 6: "Considers 40 feet normal for the whispered voice, and uses conversational voice only where the whispered voice can not be heard." It is worthy of note that Dr. Harris is the only one recommending reeducation by means of mechanical instruments, such as the Zünd, or the Meyer-Rowan.

Dr. C. R. Holmes, of Cincinnati, replies to No. 2: "The watch is important for gauging hearing. I use a stop watch especially made for that purpose which I brought from Germany; the normal distance for this watch is 5 feet." He states: "The acoumeter is also valuable, if you have a room long enough to test it." He considers 20 feet normal with low whisper, residual air, and forwards the following diagram which he worked up in conjunction with Prof. H. Neumann of Vienna.

A. B. R.		A. B. L.
	Convers.	
	Whis.	
	Noise appar.	
	Hearing tube	
	Weber	
	Rinné	
	Schwabach	
	C-1	
	A-1	
	C-2	
	C-4	
	Galton	
	Stenger	
	Vertigo	
	Tinnitus	
	Equil. dist.	
	Spont. nystag.	
	Caloric nystag.	
	Nystag. after turn.	
	Galvan. nystag.	
	Fistula symptom.	

Dr. J. M. Ingersoll, of Cleveland, states that "the watch test may be made a fairly accurate, rough test. If it is necessary to have a new mainspring put in, or any repair work done upon the watch the distance must be determined again." His watch, at present, is heard by the normal ear about 100 centimeters. He considers the Politzer acoumeter the most accurate test for hearing that we have, and states: "I have had a set screw drilled in the metal bar of my acoumeter which regulates the distance which the little hammer falls. The set screw is graded—1, 2, 3, 4, four equal spaces—and in this way I am able to regulate the sound and use the acoumeter in an ordinary size room." He uses the whispered voice very little, and the conversational voice only as a rough test. Gaps in the higher tones of young people are regarded with suspicion.

Dr. Phillip B. Kerrison, of New York, states in reply to questions No. 2 and No. 3, "The watch and acoumeter (Politzer) are similar testing instruments, the acoumeter being louder and available for deafer patients. It is a convenient test of impaired hearing, but, in our present knowledge, hardly a qualitative test. So many people with good practical hearing for conversation, hear the watch and acoumeter very badly, but I am of the opinion that one should not on this alone, give too unfavorable a prognosis, or make it the basis for excluding the individual from a particular line of work, provided his hearing by other tests, shows him capable of performing the

necessary duties." In reply to No. 4 he believes that, "the most practical use of the forks is in determining (a) the lower limit of tone perception, and (b) change in the ratio of bone conduction and air conduction." As to the duration of hearing of the various forks which might be taken as a normal standard, "various forks of the same pitch—even in such standard sets as the Hartmann fork—differ so much in different forks that this is difficult to say; it must be determined separately for each set of forks."

Dr. George A. Leland, of Boston, states in reply to No. 2: "I have not used the watch as a test for many years, since they are so variable; but when I did, I used the Waltham, open-face, procured in 1878, with a normal distance of about 5 feet," and in reply to No. 3: "I use the Politzer acoumeter obtained of H. Reiner in Wien, normal distance supposed to be about 50 feet, but as my office gives me only 25 feet of clear distance, I consider that pretty good for city dwellers, but rather short for the rural." A footnote regarding the acoumeter states: "These also may vary, though made by the same manufacturer." Normal distance for whispered numbers, using residual air—numbers without dentals and sibilants—he considers 25 feet. And in reply to No. 7: "I do not have time to employ other methods than those above mentioned, but I consider that there is no real test for the hearing, and that I get sufficient estimate from the acoumeter, whispered voice, and the forks, when necessary."

Dr. E. R. Lewis, of Dubuque, Iowa, adds: "My firm conviction is that until we have a uniformly adopted mathematical standard series of tests in which the personal equation is reduced to the irreducible minimum and standard methods of expressing results of these tests, similar for example to the oculist 6/6 vision, such discrepancies between findings will continue to be observed. I believe a standardizing committee representing the United States Navy, Army, and the American Otologic Society, should be created to bring uniformity into this, at present chaotic, field."

Dr. James M. McKernon, of New York, places "very little dependence on the watch test." He does not use one, but uses Politzer's acoumeter and considers it of value as an adjunct in the functional test. He uses the Hartmann series of forks, and modified Dench, and takes his own ear as a standard in testing. The whispered voice he considers normal at 40 to 50 feet, and spoken voice, conversational tone, 40 to 60 feet."

Dr. Alexander B. Randall, of Philadelphia, replied in full, and his views are given in detail.

1. "Retracted drumheads are usually depressed by reason of preponderant external air pressures, and are presumptive evidence of defect of ventilation, past or present. They impeach the Eusta-

chian tubes, but should be looked for as 'telltales' on the nose and throat, which may be the sole, usually are the primary, seats of trouble.

2. "The watch seems of almost no value. My loud-ticking Waltham is used in hardly one case in a thousand; it has no place in my scheme of tests; it should be heard 1 meter or more. I used to hear R. 12 feet, L. 12 inches; but now can hear it 14 inches and 8 inches, with hearing for all other tests above normal except in a noise. As this last may, like my hissing tinnitus for 40 years, mark some nerve lesion, the watch may be, as Roosa claimed, 'of value as a (prodromal) test of inner-ear impairment.'

3. "I know of no 'acoumeter' presumably so good as Politzer's. As made in Vienna by his accredited maker, I found it to vary so utterly in pitch and loudness that I never supplied myself with one, although we were in 1883 woefully short of apparatus. It ceased to be used in Politzer's clinic as soon as he retired.

4. "I have wasted much time measuring the duration of my forks and regard the timing method as specious and clumsy. Two large prismatic A-forks at my University of Pennsylvania clinic (213 d. v. s.) have duration 100 seconds air, 45 seconds bone. My smaller A-fork (clamped) has 90 seconds and 40 seconds, respectively. I find it more reliable as well as handy to measure the distance at which they are heard by air after a standard blow, which is given by allowing the fork to fall of its own weight through its own height to strike on the muscle cushion above the knee. I accept 12 inches for the smaller, and 15 inches for the larger as representing approximately normal hearing in surroundings not totally soundproof. For the A-50 I accept 2 inches; for the C-2000′, 5 inches, as minimal normal. (All flatted from French theoretical 56.7, 113.3, and 2048 d. v. s.)

5. "Most whistles sold as Galton's are travesties, sounding above the O-point or otherwise faulty. Loss of the upper range of a good whistle (not one of five Edelmann's test was quite so good as my simpler Galton) is apt to mean either a thickened drumhead, a slightly rigid stapes, or an impairment in the lower turn of the cochlea. Such a gap may not be confirmed by the corresponding Koenig rod of the Monochord. The whistle is best held near the upper back margin of the pinna (Darwinian tubercle) blowing away from the ear and sounded by successive squeezes without inspiration.

6. "The faintest articulate whisper ought to be audible at 0.5 meter; a forced stage whisper with the 'reserve air' (after tidal expiration, I understand 'residual air' to be that which can never be expelled from the lungs that have breathed) should be audible 15 meters. Conversational tone is too unstandardizable. I find it awkward and not very useful formally to measure the hearing by this means, but roughly test the patient's ability in the history

taking. Apparent gain is to be expected on each repetition, as the patient grows more familiar with the voice and the test. The habitual fatigue of the listener and the recognized effort of the speaker in home conversation form very practical tests; as does church attendance, where one usually listens from the same seat to the same voice. Were I without the handier tuning forks I should use voice.

7. "Roosa's Rinné test is by pointing the fork (A = 200 best) near to the meatus, then reversing and resting the handle on the mastoid, asking: 'Louder front or back, back or front?' Air conduction should be twice as loud (perhaps four times; i. e., twice as long) as bone conduction. Children, even mental defectives, can generally decide. A deaf ear having thus shown its hearing, Weber's test, made from several points in the mid line of the head can be correctly lateralized. The patient tells what he hears, not what he thinks. Made from the nose bridge, the patient should in a normal ear hear the 200–500 fork exactly as long as the fingers holding it can feel the vibrations (Gardiner-Brown's test.) It is easy to estimate how many seconds too short or too long it is perceived; the known proper duration of that fork by bone—this is the Schwabach. Of great practical value is the Politzer test. The A tuning fork held before the nose should be heard louder in the act of swallowing—a test of physiologic function of Eustachian musculature rather than of hearing; yet illuminating as to causation of tinnitus, prognosis of tympanic catarrh, etc.

8. "Subacute defects may clear away at once after removal of their causes, but really chronic conditions rarely will, except under treatment, usually by catheter, and not often completely. We may generally hold out a prospect of recovering the loss of the last six months, possibly of the past year or two; more than that is as unusual as it is gratifying. I have numbers of O. m. c. c. patients who are successful stenographers, although hearing very badly when they came. 'Signing the pledge does not cure hobnailed liver.' Youth and good physique of patients make for good prognosis.

9. "I depend much in the treatment of O. m. c. c. on 2 per cent aqueous solution of dionin per catheter 1 to 3 drops thrown into the catheter by pipette are blown as a coarse spray up the tube. Since using it these dozen years, I have almost no use for a bougie, so well does it clear stuffy tubes. It reddens the drumhead, but rarely overacts at all, and generally gives prompt and distinct improvement in cases resisting other treatment. Liquid petrolatum, usually with 1 to 2 per cent menthol-camphor, is also often sprayed per catheter. I rarely use the catheter in suppurative cases, but it can be very useful in a few.

10. "I am rather skeptical as to otosclerosis, having seen hardly 25 in as many years in over 30,000 new cases. Schwarze's flush of the promontory and Loewenburg's use of chloroform vapor, which feels cold instead of hot in the tympanum, are much more suspicious points than Bezold's 'triad,' which is common to all O. m. c. c. cases. Many called 'otosclerotic' by others have improved much on dionin; many on Donovan's solution by mouth; some on cirrholysin (thiosinaminbismuth biniodide). Heredity is very questionable.

11. "Noises are harmful if the internal ear is involved; in O. m. c. c. little so, unless the tubes are closed. Advanced stages of O. m. c. c. have generally shrunken, too wide tubes. Gargling, especially hot, can do much to get and keep the tubes open, and under its use 'colds' may become stepping-stones up instead of forcing the hearing downhill. A semiannual course of treatments is advisable, as much to try for further betterment as to prevent backsliding. Among the picked men of Army and Navy the prognosis should be better than among city dwellers, unless for inaccessibility of expert care. Duration of workable hearing seems too individual to permit of any estimate."

Dr. W. K. Rogers, of Columbus, Ohio, submits the following answers: No. 2. "A great deal. Any watch that has been carefully gauged; using the same watch for comparison." No. 3. "The same as a watch when the watch is not heard by air conduction. A spring acoumeter supplants the Politzer type, when the latter is not heard."

Dr. George E. Shambaugh, of Chicago: No. 1. "A retracted drum membrane is very often seen in cases where there is no defect in the hearing, when it indicates a condition produced by a previous tubal catarrah from which the patient has made a complete recovery. When observed in a case where there is a defect in the hearing and where the tuning-fork tests disclose an obstruction in the sound-conducting mechanism, it is fair to decide that the defect is probably due to an adhesive middle-ear catarrh." No. 2. "I do not use the watch to test the ability of a patient to hear." No. 3. "The Politzer acoumeter is a simple method for testing quantitatively a patient's hearing." No. 4. "For quantitative tests of hearing in addition to the whispered or spoken voice, I use, first, a large C fork, 64 d. v., which by comparison with a normal hearing ear I designate as 'normal,' 'moderately shortened,' or 'much shortened'; second, a C–4 fork, 2048 d. v., which I compare in the same way with the normal; third, Galton whistle (Edelman)." No. 5. "The recognition of breaks or gaps in the hearing for the Galton whistle in the young indicates, as a rule, that the patient is suffering from otosclerosis involving the labyrinth. The prognosis is unfavorable." No. 6. "Normal for the whispered voice depends largely on the condition under which the test is made. In a noisy downtown office building,

such as I work in, I find with the windows closed that the normal hearing is only about 5 meters. I do not use the spoken voice." No. 7. "In addition to the whispered voice I test, first, for a defect at the lower tone scale, usually by means of the large C fork. An elevation of the lower tone limit in most cases should be considered an evidence of obstruction in the conducting mechanism. Second, for a defect in the upper tone scale, by means of the Galton whistle, and for a defect in the middle of the tone scale using a C–4 fork. A defect for the Galton whistle or the C–4 fork indicates a disease of the sound-perceiving mechanism. In addition, I use the Weber, Schwabach, and the Rinné tests to assist in making the differential diagnosis between a defect due to obstruction in the sound-conducting or the sound-perceiving mechanism." No. 8. "Operations on the nose and throat never result in a restoration of the hearing to the normal in cases of chronic catarrhal otitis media. The cases where the hearing returns to the normal after, for example, removal of the adenoids, are cases of subacute tubotympanic catarrh. In those cases where the tubal catarrh is influenced favorably by operation on the nose or throat, the improvement should be expected during the first few months after operation and is likely to be permanent." No. 9. "I do not use instillation through the Eustachian catheter except in occasional cases of chronic suppurative otitis media for clearing the tympanic cavity." No. 10. "The only treatment likely to be of much value in such cases is that which aims to improve the patient's general health. This includes the removal of infected tonsils." No. 11. "This question hardly permits of a satisfactory answer, since the progress depends a great deal upon such factors as the history of the progress in the individual case and whether there has already appeared any evidence of the secondary degeneration in the labyrinth which so frequently complicates these cases of long-standing obstructive deafness.

"In conclusion, I venture to say that the prognosis as regards the progress of the deafness depends largely upon the type of process which is producing the defect, rather than upon the degree of the existing defect. For example, a patient may have a well-marked defect as the result of an exhausted suppurative otitis media, where it is highly probable that there will be no increase in the defect, at least until quite late in life. In another case there may be a very slight defect, but if this is due to incipient otosclerosis, and especially if there are other cases of the same disease in near relatives, the outlook is bad, since it would be exceptional if there was not enough progress in the condition to constitute a decided handicap before the patient passes middle life."

Dr. J. B. Shapleigh, of St. Louis, Mo., in answer to No. 2, states: "As a measure of hearing, the watch should not be used alone, but in

conjunction with voice tests. It serves better as a measure of noting variations in hearing than as a measure of hearing. Any watch may be used. There is no universal normal distance; the normal distance for the watch used must be predetermined for that watch and place by experiment with normal ears." No. 3. "As a measure of quantitative hearing, the acoumeter is like a standard watch, but somewhat better. I use it in connection with other tests; I use the Politzer type." No. 4. "I do not use forks much for quantitative testing. Medium-tone fork, should be heard about 30 seconds for normal blow, meaning by this, letting the fork strike on the knee when falling of its own weight through an arc of 90°." No. 6. "Ordinary whisper, 30 to 40 feet." No. 7. "For quantitative tests I use speech and acoumeter, or watch. For relative testing, forks (in series) and Galton whistle, with or without noise apparatus as indicated."

Dr. Sargent F. Snow, of Syracuse, N. Y., in reply to No. 2, states: "I do not regard the watch as a reliable gauge, unless we know what the normal hearing for that particular make of watch has been determined. Personally I use an ordinary stop watch which has rather a loud tick, the sound of which is subdued by a chamois covering, so that normal ears hear the tick sound at 100 inches. Some of the finer Swiss makes can only be heard 60 inches, but I have found most ordinary watches could be heard within 100 inches under quiet surroundings." No. 3. "The Politzer I consider reliable and useful in cases showing degree of deafness not measurable by watch ticks." No. 6. "I would answer by saying whispered voice test is useful in all cases of marked impairment, but hard to use in rooms of less than 20 feet dimensions; ordinary voice is useful in many cases to test ability for coordination of sounds."

Dr. Ernest De Wolfe Wales, of Indianapolis, in reply to No. 2, says: "The watch is one of the least important tests. I consider it of no importance compared with the whispered voice and low conversational voice—of interest only." No. 3. "Of interest in very deaf patients, or as a measure for future reference." No. 4. "512 U. S. fork (weighted) Rinné, 35 to 12 inches normal for my fork." No. 6. "Depends on the number whispered: 2, 4, 5, about 25 feet; 8, 9, 6, about 30 feet. I use conversational voice in all cases, and register it if not heard above 25 feet, which is the length of my office; low conversational voice should be heard about 75 feet."

Dr. Hiram Woods, of Baltimore, Md., in reply to No. 2, states: "Chiefly to note improvement for otherwise inflation I use my own Waltham watch, and I found by experience that a practically normal ear hears it at 3 feet." No. 3. "I presume very little; I used it constantly until about three years ago, when I broke it, and have not gotten another. It gives only one isolated sound." No. 6. "Twenty

to twenty-five feet. I begin with a whisper, after method described in questions, and approach patient until it is heard. If the soft whisper is not heard at all, I make the voice gradually louder until the conversational or loud voice is employed; Anything short of 20 feet whisper, I think, is abnormal."

It can be seen that there is no unanimity of opinion regarding what constitutes a normal ear. It would seem possible to devise a standard which, although not ideal, would meet universal acceptance.

DIAGNOSIS AND SURGICAL JUDGEMENT IN ACUTE ABDOMINAL PAIN.

By P. J. Murphy, Assistant Surgeon, United States Navy.

The diagnosis of acute abdominal pain is made by carefully obtained history, by examination, often by exclusion, and sometimes only by laparotomy. The moral responsibility which the surgeon owes to his patient is intensified by the very frequent inability of the medical attendant either accurately to locate the focus of the abdominal crisis, or to exclude some of the border line or nonsurgical causes of abdominal pain, and even the not infrequent cases where the cause is something entirely extra-abdominal. Several times during my service in the great Cook County Hospital, Chicago, have I seen early lower lobed pneumonia cases incised only to find a negative abdomen and to have the early thoracic physical signs develop the next day. When such oftentimes unavoidable errors in diagnosis are made by surgeons of experience and ability, one hesitates to think of the innumerable cases of tabetic crises, of the various forms of spondylitis, of intercostal neuralgia, of pleurisies, of various poisonings, as well as the many nonsurgical abdominal and pelvic conditions on which laparotomies are performed by men of less experience or ability.

Before attempting to trace the cause of any inflammatory disease within the abdomen, one must make sure that an inflammatory process really exists. To do this the early stage must be most carefully watched, or a careful history of it obtained. If these initial symptoms point to an inflammatory insult to the peritoneum, we must not be content with the vague diagnosis of "peritonitis," but, by careful investigation and observation at the beginning, trace its source, for once the peritonitis has become generalized, we are no more able to discover its origin than we can detect the origin of a fire when the whole house is ablaze.

There are various ways in which an abdominal inflammation spreads:

1. In the first group there are present all of the symptoms of a mild generalized peritonitis, often without any very sensitive spot to

give a clue as to the origin of the mischief. Often the patient will be unable to locate the initial pain and frequently a pain about the reflexly central umbilicus is all that is present. Laparotomy reveals a serous or slightly turbid exudate which is odorless and contains leucocytes but no organisms. In a few hours or days this type has an abatement of general symptoms, but the spontaneous and pressure pains progressively limit themselves to the area which was the original seat of the mischief. Here an abscess is forming and spontaneous cure may take place either by absorption or rupture into the bowel.

2. In the second group the early symptoms resemble those given above, but the peritoneal reaction is more acute. Later the peritonitis diminishes in some places, in others fibrinous exudates form, whereas at the periphery of the abdomen there are often formed encapsuled abscesses, entirely independent of the original focus of inflammation.

3. In other cases the general peritonitis subsides, the inflammation localizes, and a fresh general peritonitis develops, due either to the rupture of the primary or of one of the peripheral abscesses.

4. The most severe group is that where the serofibrino-purulent form merges into the diffuse purulent form, and here the clinical symptoms depend more upon the increased virulence of organisms and the low bacteriolytic or opsonic powers than upon the anatomical course of the peritonitis.

In diagnosis the previous history is very valuable. The patient with recurrent appendiceal, gall bladder, or renal colic can often localize the trouble. But masked histories are often obtained in criminal or spontaneous abortions. If some general disease has preceded the peritonitis, we should think of a typhoid perforation occurring in the course of an undiagnosed typhoid fever.

Age and sex are important. In the male up to the age of 20 the vermiform appendix should be the first thought, even though the pain has not started on the right side. After 20 perforated gastric or duodenal ulcers, or renal colic should be thought of in addition. When the patient is 40 to 50 always consider the gall bladder, as it is more often at fault than the appendix.

In the young female have in mind pneumococcal peritonitis, which is rare among boys, and perityphlitis, which often develops independently of the vermiform appendix. At puberty think of beginning menstruation. After puberty, with a ruptured hymen, all the inflammatory conditions which may start in the sexual organs, as well as the various abnormalities of pregnancy, must be considered. An intact hymen points to appendicitis in doubtful cases.

The physical examination is begun with a general view of the entire patient. A peaceful countenance is reassuring, while we are fearful

when the patient is restless or states that he feels well while his pulse is thready, his face and ears are flushed, and when cyanosis and jaundice proclaim a well-advanced toxemia. Rapid, shallow breathing with accessory respirations denote progressing peritonitis, while quiet painless breathing means limitation. As Dr. John B. Murphy, of Chicago, said: "A full pulse, slow in relation to temperature, is a good sign; a small soft pulse, rapid in relation to the temperature is of bad import; a pulse of normal amplitude, but soft and rather dicrotic, indicates an inflammatory focus in the abdomen not yet overcome, but the age of the patient must always be considered when evaluating the pulse rate."

In the abdominal examination always first empty the bladder with a catheter, as a full bladder is often mistaken for an effusion. This catheterized urine is examined for pus and blood. Slight blood commonly occurs in appendicitis. Bile pigment suggests disease of the bile ducts, while sugar suggests pancreatic trouble. Meteorism is more difficult to detect in the female. It is well always to use the one-fingered palpation—percussion as well as ordinary percussion—as thus a cause of dullness can be felt as well as heard. A localized metallic note is an important sign of strangulation, a kink, or of local peritonitis, and the same holds true of circumscribed crepitations, or a peristaltic metallic note.

Palpation must be very cautious, as the protective wall of an abscess can be easily broken down. Very important is the involuntary muscular defense rigidity which is most marked over the site of trouble until the peritonitis becomes generalized. Often the lumbar muscles alone are rigid in retrocaecal or pelvic appendicitis. Expressions of pain which nervous people proclaim when examined should not mislead. In real peritoneal pain more suffering is revealed when the hand is suddenly removed after gentle pressure.

In the female, a rectal and vaginal examination should always be made to ascertain the condition of the female generative organs.

Regarding the white blood corpuscles, a great leucocytosis probably indicates an inflammatory disease, but some of these, as typhoid, have a normal or diminished count. As Kocher said, the main thing in appendicitis is not to demonstrate a hyperleucocytosis, but to prevent its onset by early operation. However, a leucocyte curve is of value for a surgeon in deciding whether a late case of appendicitis requires operation, or whether a second operation is necessary in the course of a suppurative disease of the abdominal cavities.

A syndrome of acute and often localized pain, vomiting, fever, leucocytosis, and involuntary or voluntary rigidity with tenderness usually denotes a surgical condition, and this syndrome is very common and helpful in early diagnosis.

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The conditions found upon physical examination and from which we construct a diagnosis may be classified as follows:

(*a*) Symptoms of pain without many perceptible changes.

(*b*) Symptoms of pain, with signs of general peritoneal irritation without definite lŏcalization.

(*c*) Peritoneal irritation with circumscribed changes.

(A) SYMPTOMS OF ABDOMINAL PAIN WITHOUT MANY PERCEPTIBLE CHANGES.

Here we have spontaneous pain and local tenderness, often without rigidity. There have to be considered a mild attack of appendicitis, renal or biliary colic, mucous colitis, some disease of the female generative organs, acute intestinal obstruction, respiratory diseases, spondylitis, tabetic crises, and hysteria.

Renal colic shows a normal or enlarged kidney, sensitive to pressure, with marked reflex contraction of lumbar muscles. Pain is of two kinds. (*a*) Dull pain in the loin, associated with local tenderness on pounding the back over the kidney; (*b*) renal-colic pain; cutting, very severe, lasting with intermissions for a few hours. It radiates to testis, penis, or labia. Urine shows a large amount of blood, occasionally stones, some pyuria. Occasionally there is temporary anuria. X-ray examination shows the oxalate type of stone as shadows.

Dietl's crises in floating kidneys are characterized by crises of severe pain, fever, collapse, vomiting, scanty urine containing blood, pus, uric acid, and oxalic crystals, followed by a great flow of urine. Bimanual examination shows a sensitive, kidney shaped, variably movable tumor.

Pyelitis shows large amounts of pus and some blood in urine. Pain more localized on the side of the affected kidney.

Gallstone colic has a sudden onset in which pain is severe and colicky, and begins at a point just internal to the outer border of the rectus and at level of or above the umbilicus. There is always a tender gall bladder, and the jaundice, which occurs in 15 per cent of cases, and which follows the colic, is always a foreign body jaundice. Röntgen rays at present show stones in about 80 per cent of cases. There are nausea and vomiting with chills, fever, and a leucocytosis. It is rare to find a cholecystitis without a gallstone which causes acute abdominal pain. Gallstone colic may be confused with duodenal pain; but gallstones usually occur in females and duodenal ulcers in males.

Mucous colitis usually occurs in patients with hysteroid stigmata. The pain is either ileocæcal or over the descending colon. It is paroxysmal, colicky, and periodic. Not much rigidity is present, rarely a fever or leucocytosis, and there is a history of constipation with occasional passages of hard stools covered with mucous casts of bowel and tenesmus.

Various types of gastroenteritis rarely confuse because of the marked diarrhea and the general character of the complaints as well as the short course of the disease.

Intestinal obstruction.—The vague pains caused by adhesions, by anomalies of position and of form belong in this group. If the history and skiagram do not clear up the diagnosis, the laparotomy on a future well-developed intestinal obstruction will. In this group belong also the vague pains of a Jackson's ileocæcal membrane, three of which I have removed since being in the naval service, and those of a Lane's kink.

Tabetic crises occur usually in those over 40 who give a history of a luetic infection and frequently of positive blood or cerebro-spinal fluid Wassermann tests. There may be a marital history of paralysis or miscarriages. There are present the girdle sensation of pressure, the lightning pains, vesical disturbances, inequalities and irregularities of the pupils with the Argyll-Robertson pupil, loss of patellar knee jerks, a positive Romberg equilibration test, and later the stamping heel gait.

Vertebral disease, either simple, infectious, tuberculous, or malignant, rarely causes serious diagnostic difficulties.

Pneumonia or pleurisy, especially in little children, often have referred pain in the abdomen, but physical signs in the chest must always be sought and are usually present then or shortly afterwards. Thoracic pain, cough, rapid difficult breathing are often present.

Hysteria is suspected when there is a striking contrast between the complaints made and the actual conditions found. There are usually other signs.

Lead colic should always be thought of. There is history of occupation, basophilic degeneration of red blood cells, lead line on gums, constipation, etc.

(B) DIFFUSE PERITONITIS WITHOUT LOCALIZATION.

In this group the symptoms of fever, rapid pulse, general tenderness, an effusion either free or badly localized, a rigidly contracted abdominal musculature, or a distended abdomen, all tell us of acute peritoneal inflammation. No longer can nervous disease or colic be suspected. Here obstruction can be confused with peritonitis.

Peritonitis.—Sudden onset of pain which is at first diffuse and later localized more to focus, vomiting follows, temperature slightly raised, rapid pulse, shallow thoracic breathing, no abdominal distention but tenderness and muscular rigidity. Tenderness either over one or both lumbar regions. Neither flatus nor stools pass, no visible peristalsis. Pain is constant, dull, varies in severity, but never ceases completely. Usually effusion is demonstrable. The knees are drawn up and the head flexed. There is a higher leucocytosis and collapse with peritonitic facies are present.

Acute intestinal obstruction.—Onset also with abdominal pains and vomiting; pulse quiet and full, however; temperature normal; breathing not accelerated nor shallow. Abdomen slightly distended; during periods of quiescence it is not tender to pressure nor percussion; slight abdominal rigidity. No passage of flatus nor stools. Paroxysmal attacks of pain occur, during which peristalsis can be seen if the abdominal wall is thin, and this attack rarely lasts a minute. Any bloody mucous stools cease after several evacuations. One often can feel the incarcerated hernia, or the sausage-shaped tumor of an intussuception. Effusion is very rare with less early general prostration.

I have seen several cases of ileocæcal tuberculous peritonitis, which, except for leucopœnia, could not be differentiated from an acute appendicitis.

Mesocolic appendicitis with an abscess between or behind the coils of small intestine may be confused with general peritonitis unless the whole course of the illness is considered.

Acute pancreatitis has usually a history of gall bladder trouble with colic and icterus. Onset is fulminant and overwhelming with very quick and profound collapse. The pain is epigastric, very sudden in onset, is the most agonizing pain in the abdomen and may be constant or paroxysmal. There is epigastric abdominal distension.

Perforated gastric or duodenal ulcer has a history of chronicity of epigastric pain, eructations, nausea and vomiting, with pyrosis extending over years, and having periodicity in the spring and fall. The pain has had a definite relation to meals coming on from one-half to one and one-half hours after meals, is burning, and is relieved by vomiting and alkalies. Vomiting has occurred at the height of the pain, and the vomitus is highly acid and contains large amounts of blood periodically, except duodenal ulcers which show varying amounts of stool blood. Hyperchlorhydria may have been demonstrated. At perforation the symptoms are those of peritonitis with most of the findings in the epigastrium.

Embolism of superior mesenteric artery.—There is usually a left-sided heart lesion. Onset is sudden with intense abdominal pain which is persistent, dull, deep; effusion, bloody stools with retension of flatus and vomiting of lumps of blood are present.

Typhoid perforations rarely cause a very acute abdominal pain.

(c) LOCALIZED PERITONITIS.

When there are evident symptoms and signs pointing to a localized focus our diagnostic task and surgical judgement are much easier whether there are general symptoms or not.

Epigastrium.—The gradual or sudden perforation of a gastric ulcer or rarely of a cancer is the most frequent cause of epigastric inflammation. Less frequent are pancreatitis or hepatic abscess.

Right hypochondrium.—Gall bladder and bile duct stones and inflammations are the commonest causes of pain in this area except in the Tropics where abscess of the liver is the most frequent occurrence. Luetic hepatitis of the gummatous interstitial type frequently simulates an acute gall bladder, and a close history and, if time permits, a Wassermann should be taken and made. Rupture of a duodenal ulcer is relatively rare. Occasionally an incompletely rotated cæcum with its long vermiform appendix is found in this region.

Left hypochondrium.—Perforated gastric ulcers are nearly always the foci. Splenic abscess is very rare. Herniæ beneath the ligament of Treitz are sometimes seen. The secondary abscesses of an appendicitis often occur in or travel to the left deep hypochondrium.

Lumbar regions.—The kidney has to do with retroperitoneal inflammations, or occasionally a retrocæcal appendix. If there is evident peritoneal involvement, the appendix is usually the focus. Parametritis often extends toward the lumbar region.

Lower abdominal region.—Any inflammation here should always suggest either an appendicitis or trouble in the generative tract. In males, even though the trouble is chiefly left-sided, we must think of appendicitis or more rarely an acute seminal vesiculitis or sigmoiditis. In females think also of salpingitis, parametritis, extrauterine pregnancy, of the gall bladder, and of beginning menstruation.

Appendicitis is the most common surgical cause of abdominal pain. There is a sudden severe pain in the right lower quadrant and early about the umbilicus. Nausea and vomiting follow the pain in a few hours. There is involuntary rigidity over the point a little above McBurney's and often over the whole right lower quadrant, including the right rectus muscle. The tenderness is first generalized but later localized over the appendiceal area. Fever of 101° to 102°. Leucocytosis of 12,000 to 25,000.

Salpingitis gives a history of gonorrhea, abortion, or instrumentation. Pain is usually slight, bilateral, more gradual in onset, and the area has been sore and tender for some time; it is low down. Rigidity, if present, is slight. Bimanual shows one or two sausage-shaped and tender masses lying on either side of but connected with the uterus and often fixed behind it. If unilateral, a pyosalpinx is usually left-sided, though it may be complicated by an appendicitis. There is an increased vaginal secretion with a variable hemorrhage. There are chills, fever, and leucocytosis.

Ruptured ectopic pregnancy gives a history of something unusual about the last menstrual period, either too short or too long or more

painful; with the atypical symptoms of pregnancy or of a previous ectopic gestation, with missing of one or two periods, and irregular hemorrhages from vagina with cramplike pains in lower abdomen. A previous bimanual may have shown a slightly tender, boggy, pulsating, sausage-shaped, unilateral mass to the side of but not connected with the uterus and the cervix often pushed upward and forward. At time of rupture there is sudden sharp and severe unilateral pain, with a bloody vaginal discharge, and the woman usually faints and has symptoms of shock and hemorrhage. A lateral swelling may be felt and vomiting and slight fever of 100° to 101°, but without rigidity, are usual. After rupture the needle and finger detect a bloody tumor in the posterior fornix and the cervix is pushed upward and forward.

Twisted pedicles of ovarian cysts give history of menstrual disturbances. The tumor is sharply defined, usually central, quite large, elastic, fluctuating, low in the pelvis, and vaginal examination shows its closeness to uterus. Pain is very severe and increasing.

Sigmoiditis.—Symptoms of colitis, diarrhea, bloody and mucous discharge with a sausage-shaped swelling over sigmoid. Perforated Meckel's diverticulum is very rare.

Cases of abruptio placentae and of uterine rupture are usually evident, and parametritic abscesses are gradual in development, while diverticulitis of the colon is very rare.

Of even more importance than exact diagnosis in acute abdominal pain is surgical judgement. In cases of peritonitis we must remember that all cases do not present a typical clinical complex. At times on doing a laparotomy we find the intestines swimming in pus, even though clinically the case did not appear serious. The pulse remains full, and the involuntary abdominal rigidity is slight. Vomiting is absent, as is intestinal peristalsis, and, despite the poor prognosis, the patient recovers. There are two good pathological reasons for this. Often the peritonitis is not so generalized as it appears to be. Although the convolutions of the small intestine are bathed in pus, the spaces between the loops are not infected, being protected by omentum and adhesions. Secondly, the pus organisms are of slight virulence very frequently. In children the pneumococcus is comparatively harmless, and although the case to us at operation looks as though it must prove fatal, it recovers. So also other microorganisms may be equally innocuous in rare instances. One need only recall cases of acute peritoneal sepsis which prove fatal before pathological changes have had time to form in the serous membrane to realize that prognosis of a case of peritonitis depends more upon the virulence of the microorganisms than upon the extent and intensity of the anatomical pathological changes.

A McBURNEY INCISION FOR EVERY APPENDIX.

By L. R. G. CRANDON, Surgeon, United States Naval Reserve Force.

A newcomer into the Medical Department of the Navy is impressed and pleased with the obvious policy of the department, not only to allow, but to encourage individual surgeons to follow their own methods of treatment. Assuming that all such methods are within safe limits, they are further checked and guided by the practice of frank conference and discussion, not based upon rank necessarily, but rather upon free expression of professional opinion by surgeons of all grades.

Differences in surgical technique, however, may signify only inherited tradition, early training, or merely custom, and may not always represent thought and conviction.

The technical differences in methods of incision for appendectomy is one of the most important examples of need of clear thinking and conviction. In one naval hospital the principal operating surgeon was educated in a right rectus technique, and he and all his juniors operate only that way. In another naval hospital the McBurney method is advocated and followed for clean cases; in a third the gridiron incision is used for all cases.

This paper is a brief plea for the last course, namely, the use of the muscle-splitting (McBurney) incision for all appendicitis cases in the Navy.

The details, as used at the United States naval hospital at New London, are:

The skin over, or slightly external to, McBurney's point is pinched vertically by left thumb and index of operator, while, vertically below, the left thumb and index of the assistant pinch the same fold of skin. Incision is then made on this pinched fold of skin transverse to the long axis of the body, through skin and fat.

The (aponeurotic) external oblique is punctured with closed, sharp-pointed scissors, which, by opening them, will then split the fibers, cutting none.

Similarly the closed scissors stab the internal oblique, tear the fibers apart, then the two index fingers of the surgeon tear open internal oblique and transversalis, each along its own lines of cleavage.

The peritoneum is cut by scissors transversely and, therefore, parallel to and beneath the skin incision.

The incision, as a whole, can be enlarged by cutting skin at either end where room is desired, then two fingers of each hand, inserted through the whole depth of the wound, can stretch it open, each layer tearing along its own fibers.

The advantages of the right rectus incision are that it is easier to make, that it can be made big enough for both hands and that through it an error in diagnosis may be corrected, though in men this should be a rare event.

The disadvantages of the right rectus incision are that—

1. It is not over the appendix.

2. It exposes small intestine and that through this clean region one must enter an infected iliac fossa.

3. For drainage, it opens an indirect path, with a large granulating area to close.

4. Hernia, especially after drainage, is not infrequent.

The disadvantages of the McBurney incision are:

1. It is more difficult to make.

2. It is not possible to make a complete abdominal exploration through it (this is rarely needed in men).

3. More skill and care are necessary to maintain drainage through it. (One should drain in case of slightest doubt; the original wick not to be touched for full five days.)

The advantages of the McBurney incision (as described) are:

1. The transverse skin incision (Weir) is the diagonal of the square made by the gridiron formed by external and internal oblique muscles, and therefore gives the greatest opening for the smallest incision. (One inch is enough for nearly all cases, though it can be made 2½ inches if necessary.)

2. It is always directly over cæcum, external to and below which the appendix is in 85 per cent of all cases; no small intestine should be seen during the operation.

3. The field exposed is thus anatomically limited to the right iliac fossa.

4. Whether drained or not, every muscular action of the abdomen tends to close the split muscles and hernia is impossible.

5. All closed cases are up on their second and third day; all drained cases in from 7 to 10 days; practically all cases can be discharged to hardest duty at end of 28 days.

These conclusions are based on over 6,600 cases performed by the writer personally. Less than twenty times has an extension down along right linea semilunaris or a median incision been necessary for unusually placed appendix or pelvic complications or wrong diagnosis.

In brief, this transverse muscle-splitting incision is both anatomically and pathologically good, and insures young men in the service the *muscular integrity of their abdominal walls, an invaluable asset in the strenuous life of the Navy*, as well as in industrial life.

WHAT EVERY YOUNG NAVAL SURGEON SHOULD KNOW.

By H. C. Curl, Medical Inspector, United States Navy.

In a public address the Surgeon General once emphasized the need for specializing in branches other than surgery, showing that many other lines of work are of equal importance.

In telling of the need for men trained in physical diagnosis, hygiene, bacteriology, and other special branches of medicine, he voiced, I am sure, the opinion of those of us who have been in the service for some time, an opinion which will be appreciated by the younger members of the corps when they have become more familiar with service conditions and needs.

The writer has served for a good many years in naval hospitals and has worked with scores of medical officers, many of them most excellent men. In watching and studying their work he has formed an opinion of what might be called the "standard" type of efficient medical officer.

He should be, first of all, a good all-around man, and as a second qualification he should on some one subject be a little more proficient than most of the other members of his corps. Particularly in hospital work, though also at sea, the man who has specialized until he takes no interest in general work, while valuable in his line, is not as useful as the good all-around man who does most things fairly well.

A "dependable" man who knows his heart and lung work, who can use a cystoscope for routine examinations, work up his material in the laboratory, and treat a fracture well, is likely to have a wider range of usefulness than the man who can do only nose and throat work. But if he is an all-around man with the *added* ability to do special work, he will be much more valuable, will be available anywhere, and can be depended upon to do what is necessary under all conditions.

To learn to remove tonsils and do submucous resections is not in itself a matter of very great difficulty; to differentiate between pneumonia and pleurisy needs only care; to use the cystoscope fairly well is not a matter of extraordinary skill but of practice and patience, and to do an uncomplicated appendectomy or hernia is one of the easiest things in surgery.

Having been particularly interested in surgery, I want to propose what might be called the *minimum* requirements for the average naval surgeon, not specializing in surgery.

I must leave to the specialists in other branches the determination of a *minimum* of attainments for their work.

We must presuppose such a thorough, practical knowledge of asepsis and operating-room technique as may be secured by an interneship in any good hospital.

As to operations which we all should be able to do, and do in emergency with reasonable skill, the following are essential:

(1) Appendectomy: Of all emergencies in the Navy acute appendicitis is the commonest, and every junior man in the Medical Corps should have an opportunity to do a few appendectomies under the direction of an experienced man. To assist at these operations is of

benefit, but to do the operation is a hundred times better. Every man in the Medical Corps has or will at some time be called upon to do this work in an emergency.

(2) Mastoid drainage: Acute mastoid inflammation is an emergency not so frequently met with, but which, when it does occur, permits of no delay. To clear out the mastoid and drain the middle ear without going into the lateral sinus is not difficult.

(3) Simple stomach and intestinal work, such as we find in many gunshot wounds of the abdomen, typhoid perforations and upper abdominal diseases: To know well one type of intestinal suture will enable the surgeon to handle many emergencies of this sort and give the patient his only chance.

(4) To trephine the skull, elevate depressed bone, and stop hemorrhage, when indicated, is often the only means of saving the patient and must be done without delay.

(5) A good amputation: The necessity for this work is obvious.

This list is not long; the steps of the operations and the anatomy involved are easily learned and retained, and certainly the mastery of these subjects is a part of the equipment of my "standard" man.

I believe every possible chance should be given to junior officers to do surgical work under the immediate direction of the operating surgeon. The man who has done a large number of appendectomies does not need the experience, but the man who has done none must do his first operation some time, and how much better for him and the service if he does it under the direction of an experienced operator. So these few operations are among the things every young naval surgeon should know.

PREVALENCE OF SYPHILIS IN HAITI.

By F. X. KOLTES, Surgeon, United States Navy, Medical Director, Gendarmerie d'Haiti, and A. ALBRECHT, Chief Pharmacist's Mate, United States Navy, Lieutenant, Medical Service, Gendarmerie d'Haiti.

The medical man who visits Port au Prince and remains long enough to note the physical appearance and habits of the people and learn something of the civic and sanitary conditions existing there, must soon be led to suspect that when infectious diseases gain an entrance there they have a clear field for propagation unchecked by any human agency of prevention. After a stay of over two years in Haiti we have found these suspicions confirmed.

Haiti has about 2,000,000 inhabitants, mostly pure black, the density of population being about 200 to the square mile. Three-quarters of the people live in the country, among the mountains and valleys of the interior. The rest live in the cities, which generally are situated on the seacoast and vary in population from 4,000 to 100,000.

Nearly all the diseases which ordinarily affect the Tropics of the Western Hemisphere are found in Haiti. There are, however, a few notable exceptions to the list, comprising diseases characterized by high mortalities, the absence of which for many years probably permitted the steady increase of the Haitian population. Principal among these are smallpox, yellow fever, cholera, and, to a great extent, dysentery. Intestinal parasites, including hookworm (infection about 20 per cent in small groups examined), are very prevalent, but these do not cause marked symptoms, one seldom seeing such clinical pictures as were described in Porto Rico, which seems to bear out the theory of the relative immunity of the pure black to the symptoms of hookworm disease.

In a general way we consider that the diseases causing the greatest number of deaths are tuberculosis, infantile disorders, and malaria, all three of which have their highest morbidity in the cities where the death rates are highest. One sees relatively more old people in the country, which bears out the supposition of a lower death rate there in spite of the fact that it is chiefly in the rural districts that so many infants perish from tetanus infection of the umbilical cord.

In considering the effect of diseases upon a community in the broad sense we may divide them into the following two classes, viz, diseases characterized by a certain immediate mortality and diseases characterized by the evil after effects exerted upon the physical condition of the individual and the race. In the latter class can be included the venereal diseases, all of which, especially syphilis, are extremely prevalent in the cities of Haiti.

With a view to gaining an accurate idea of the extent to which syphilis affects the inhabitants of Port au Prince, we selected three groups of persons (the only ones available for the purpose at this time) and examined their blood for the Wassermann reaction. We furthermore obtained some data from the presence of physical signs at the time of examination and elicited such histories as were obtainable under the circumstances, for the purpose of determining to what extent the disease is congenital or acquired.

The first group comprises practically all the gendarmes stationed in Port au Prince. Of this number, about a hundred were men who had just been recruited, while the remainder had served for varying periods of time up to nearly two years. This subdivision was made in order to determine what influence soldier life—carrying with it regular pay and a certain amount of affluence—had upon the incidence of syphilis among them. As, however, we found no material difference in the two subclasses, the results need not be given separately.

The second group consisted of prisoners confined in the penitentiary.

The third group consisted of boys, ages from 5 to 12 years, from the Boys' Industrial School, Port au Prince.

The tests were made in the laboratory of the Gendarmerie Hospital of Port au Prince by Lieut. Albert Albrecht, S. M., G. d'H. A modified Emery technique was used. Two tubes only were used for each test. In the front tube 4 units of 1/30 dilution of antigen and 1 unit of patient's serum; in the second tube, 4 units of salt solution and 1 unit of patient's serum. Serum was of course added to the salt solution tube first and then to the antigen tube. The pipette was then washed three times with salt solution before proceeding to the next specimen of serum. Before the addition of any serum the salt solution and antigen solution were measured out. The racks were then placed in the water bath at 38 C. for half an hour. Four units of hæmolytic system were then added to each tube and the racks again placed in the water bath at 38 C. for one hour and the final results read.

The test tubes used were 5/16 of an inch, internal diameter, and the hæmolytic system was added to all tubes without washing the pipette, care being taken that the pipette did not touch the sides of the test tube or its contents. The tubes were then gently tapped on the bottom to evenly distribute the hæmolytic system.

This method of adding the hæmolytic system is a great time saver, especially when one is doing a large number of tests.

The *hæmolytic system* was prepared by soaking 350 square millimeters of amboceptor paper in 5 mils of salt solution, shaking thoroughly for 15 minutes, filtering and adding it to 0.2 mil of red cells that had been collected in 2 per cent sodium citrate salt solution and washed with salt solution five times. It was then placed in the water bath at 38 C. for half an hour.

Antigen.—1/30 dilution of Noguchi acetone insoluble lipoid was used. Numerous controls were made with this antigen from time to time and normal serum never showed inhibition of hæmolysis in 1/15 dilution.

Amboceptor.—An antihuman red cell amboceptor prepared from the rabbit according to the method of Noguchi was used. We were fortunate in making a very strong amboceptor; 200 square millimeters added to 5 mils salt solution and 0.2 mil washed red cells produced perfect hæmolysis in the salt solution controls; however, 350 square millimeters, as stated above, was used for making 5 mils of hæmolytic system in this series of tests.

Complement.—The active complement normally present in the human serum was used. In standardizing amboceptor and antigen pooled serum from three people was used.

Blood specimens were all collected in Wright tubes on the morning we did the tests. No specimen of serum had been collected longer than four hours when the test was completed.

TABLE I.

	Number examined.	Wassermann positive.	Wassermann negative.	Per cent positive.
Gendarmes	450	315	135	70

TABLE II.

	Number examined.	Wassermann positive.	Wassermann negative.	Per cent positive.
Prisoners:				
Male	243	167	76	69
Female	57	38	19	67
Total	300	205	95	68

TABLE III.

	Number examined.	Wassermann positive.	Wassermann negative.	Per cent positive.
Industrial School boys	100	79	21	79

The combined results are given in the table below:

TABLE IV.

	Number examined.	Wassermann positive.	Wassermann negative.	Per cent positive.
Three classes combined	850	599	251	+74

Out of the total positive Wassermann, 501, representing 80 per cent of the whole, showed complete inhibition of hæmolysis, the remainder showing something less than complete inhibition. There is, of course, a larger percentage of syphilis in these groups than is shown by this series of complement fixation tests, as old cases of syphilis may show a negative test even though the men still have the disease. Luetin tests and complement fixation tests on spinal serum would probably have increased our positive percentage very considerably.

That the cause of these Wassermann positives is syphilis and not yaws, there can not be much doubt. While yaws is found here to the extent that one sees a case now and then in the cities (it is more common in the country), the great preponderance of the former

disease noted in the course of routine work makes it certain that yaws was a very minor factor in the results. This is certainly the only conclusion that can be drawn from the results of the survey of the small boys, they having been under observation for a considerable time and being known not to have yaws. Leprosy, which is considered by some to cause a positive Wassermann reaction, can be excluded in our cases on account of the absence of any of its symptoms.

The attempt to obtain histories of primary and secondary lesions was unsatisfactory, because these matters make but little impression upon a primitive people and are often soon forgotten.

From the gendarmes we secured a history of a "sore" in 52 per cent of the positive cases. Some of these no doubt were chancroidal and gonorrheal complications. It is still more difficult to secure a reliable history of a secondary rash, it being so inconspicuous on black skins. No particular value can therefore be placed upon the figure obtained, which was 34, representing about 6 per cent of the positive Wassermanns. However, if it be difficult to obtain direct evidence from the adult cases, the high incidence of syphilis in the group of boys whose youth precludes the possibility of their having acquired the disease through venereal exposure shows a tremendous amount of congenital transmission of syphilis.

As regards signs and symptoms present in our cases, we examined each patient when the blood was taken, giving special attention to those which are more or less diagnostic. The gendarmes, of course, showed no open or conspicuous lesions—excepting the few who became infected recently. A great many of the recruits who presented themselves possessed such diagnostic stigmata as epitrochlear enlargement, blotchy skins, etc., but these very common defects had to be disregarded altogether, else we could never have secured a full complement for the organization.

TABLE V.—*Groups I and II.*

	Wassermann positive.	Double epitrochlear.	Mucous patches.	Leg ulcers.	Sore.
Gendarmes	315	72	7	10	.....
Prisoners	205	34	1	8	1

TABLE VI.—*Positive Wassermanns of the Maison Centrale.*

	Total positive.	Double epitrochlear.	Tibial nodules.	Hutch. teeth.	Leg ulcers.
Boys	79	39	7	2	6

Tables V and VI show less than 50 per cent of double epitrochlear enlargements and almost negligible numbers of the other signs upon which we commonly depend in routine examinations for syphilis. Evidences of visceral syphilis were not systematically sought for during the course of this survey because it would have necessitated prolonged examinations impossible under the circumstances, and any statements made by us upon the subject of symptomatology are no more than impressions gained from routine medical work. Among these impressions are the frequent varioloid character of the secondaries, the frequent iritis in mulattoes—this often in spite of vigorous mercury treatment—and the rather common picture of painful rheumatoid affections, involving the thigh and leg muscles, which always show a positive Wassermann and clear up after a few intramuscular injections. As regards the pathological changes that occur in later life we can venture no statement, excepting to say that we have not met with any cases of locomotor ataxia or paralytic dementia.

The general average of hemoglobin estimates (Tallquist) for all groups was 84 per cent, with only five falling below 70, this high average existing in spite of the presence of chronic malaria and intestinal parasites in a considerable number of the patients. Summing up what has been discussed regarding the effect of syphilis upon the physical condition of our positive cases and remembering that practically none of them was sick in the ordinary sense of the word and had never had treatment, it seems to us that there exists in them an unusual ability to hold the disease in abeyance.

We have often wondered, therefore, bearing in mind the great antiquity of syphilis in this island, whether a racial immunity may not have developed in the people of Haiti. Whether or not it can be proved that the explorers of the fifteenth century were the first to see the disease, we know positively that many of the ancestors of the Haitian people of to-day had already arrived here before the year 1500, and therefore become infected. Perhaps the transmission of the disease through one race during over 400 years may have resulted in a partial immunity, manifested by the ability to resist the appearance of many of the symptoms which characterize the later stages of the disease. Whether or not an unusual degree of immunity exists, there is no doubt that syphilis has distinctly left its mark upon Haiti in having contributed to a lowering of the physical, mental, and moral standards of the inhabitants, manifested by a lack of bodily vigor, laziness, and "dopiness," inclination to sleep at all times, inability to perform tasks that require concentrated effort, stupidity, a universal tendency to thievery and beggary, lack of civic honesty, cruelty to man and animals, absurd presumptuousness, and a want of self-respect shown in their daily habits and costumes. It is, of course, not contended that all of

the above shortcomings are the direct result of syphilis, nor that they all, or even any of them exist in all Haitians; but that the deleterious effect of its toxins has been an important factor in this moral disintegration we believe to be true. Therapeutic tests seem to bear out this supposition.

We have given several thousand injections of mercury to gendarmes, to which they have responded in a remarkable manner; not to the extent of having been cured of thievery by mercury, for example, but by releasing, as it were, the normal physical and mental attributes which had been lying dormant in half sick bodies for an indefinite number of years.

Among the effects of syphilitic infection we generally expect to find large infant mortality and frequent cases of sterility and stillbirths. We have not made investigation of this subject and are not prepared to say how greatly these factors have affected the normal attrition of population. The population of Haiti, in spite of continuous revolutions, lack of sanitary precautions, and emigration has at least held its own, if it is not increasing, so that it can be stated that syphilis has not had sufficient influence to swing the balance over to the side of depopulation.

In this connection it is vitally important to know to what degree the results of our investigation of the three groups are indicative of the prevalence of the disease throughout the country. These groups are not, of course, wholly representative, yet the singular approximation of the figures obtained is very suggestive of their being a fair index for the whole, especially as all three classes were recruited from towns as well as from the country.

As regards the probable incidence of syphilis in the better class, we may say that while there is a distinct social demarcation between upper and lower classes, we believe, for various reasons, that from the viewpoint of the epidemiology of this disease, the population is more homogeneous. For instance, there is considerable intermingling "sub rosa" between the classes, brought about by reason of loose marriage relations of the upper class male and the almost total absence of marriages in the lower classes. Besides, many of the well-to-do upper class nearly white males live, as is common throughout the West Indies, in a state of virtual polygamy; that is to say, they have a legal wife besides one or more concubines, each one of whom has a family of children and each her own establishment. We know of one man in Port au Prince who is reputed to have altogether 60 children.

It is not difficult therefore to understand how syphilis could permeate to an equal degree the entire population, and, if its prevalence is really indicated by our results, it is an especially serious problem

here, both for the natives themselves and for the forces of the American occupation which now is definitely established in Haiti.

The Haitian-American treaty of 1916 provided for the establishment of a gendarmerie of native troops with American officers. The purpose of this force is, in the main, the preservation of peace and the protection of the individual rights of the citizens of Haiti. While its prescribed functions have been well carried out during its brief existence, it is recognized amongst its officers that the gendarmerie has done more than what is merely demanded of it by the treaty, chief of which being its service as an example to the Haitian people of honesty of administration, and efficiency as a military force drilled in discipline and alert in attention to duty. While it is quite impossible at this time to stamp venereal disease out of the country, the medical department of the gendarmerie has realized the necessity of having a healthy personnel, both for its value as an object lesson as well as for military efficiency.

The Wassermann survey of the gendarmerie was at first incidental to a plan of investigation of the personnel for venereal disease, malaria, and intestinal parasites. When the extraordinary prevalence of syphilis was revealed, we felt the importance of giving the matter our special attention. A systematic plan of treatment was instituted, with what success we hope to record in a future report.

WITH DESTROYERS IN THE WAR ZONE.

By L. H. Williams, Assistant Surgeon, United States Navy.

In view of the noteworthy work of the American Naval Expeditionary Force operating in European waters it will perhaps be of interest to know something about the Medical Corps as represented on the United States destroyers.

Before war was declared there was assigned to each destroyer one chief pharmacist's mate or pharmacist's mate first class, who did first-aid work and took all cases requiring diagnosis and treatment to the medical officers of "mother" ships.

The exigencies of war and the conditions under which the destroyers are now operating have rendered it advisable for each destroyer to have a medical officer in addition to the hospital corpsman. This enables each destroyer to act more as an independent unit working in conjunction with the "mother" ships.

The "mother" ships are well equipped for surgical cases and non-infectious diseases occurring in the flotilla, while infectious diseases are cared for ashore in a hospital manned and officered by our allies.

As the medical officers of the "mother" ships are fully occupied with medical examining boards, operations, and care of the sick

generally, their duties are essentially like those of medical officers on any battleship and need no amplification or description here. Though their work is exceedingly interesting, being carried on so near the scene of operations, yet it is with the medical officers serving on destroyers, the pioneers of the Medical Corps in this war, who are constantly at sea and are undergoing the trials of modern sea warfare that this article is concerned.

During the past six months the destroyer flotilla has been most active in saving ships and rescuing merchantmen whose vessels had been sunk by submarines, as well as in carrying on a successful offensive against submarines. In all these operations the medical officers have played a part of increasing responsibility.

The life and duties of the medical officers serving on destroyers are very different from what they would experience on battleships or ships not in the theater of war. On a battleship the medical officers are in a sense out of touch with the executive branch and have little or no information of what operations are to be carried out till these are well under way or completed. This is not the state of things on a destroyer, for here the medical officer shares with the other officers a complete knowledge of the ship's movements, what enterprises are to be attempted, and all matters of interest concerning known enemy operations. Many hours are spent upon the bridge where he sees the action which may decide the fate of his own ship or that of the ship under her protection. He knows that always while on patrol or convoy duty there is the lurking danger from mines or submarines and the possibility of combat with an enemy raider. One day he realizes the fierce atavistic joy of the man hunt when his ship is chasing an enemy submarine; the next he feels his heart bound at the sight of brave faces that force a smile through their agony as the destroyer comes to the rescue of the survivors of torpedoed merchantmen or men-of-war, in frail boats or rafts, at the mercy of the sea.

The medical officer's first duty is to keep the crew physically fit to resist the cold and wet encountered and to endure the nervous strain inevitable under the circumstances under which the destroyers are operating. Though the men are kept in as good physical condition as possible, life on the destroyers is very hard and trying, owing to the ceaseless roll and pitch of the ship, the never-ending toil of keeping the ship ready for any call, the constant watchfulness necessary, and the consciousness of hidden danger. These have an inevitable effect on officers and men after a week or so at sea, so that a day or two in port becomes necessary to refit the personnel and ship after such continuous strain.

After the routine sick calls of the day are finished, the medical work is essentially emergency. The medical officer must be ready

for emergencies not only on his own ship but those which may come from other sources. The facilities for emergency work on destroyers is at present exceedingly limited. Only one pocket case is now available on most destroyers.[1] A few have the field expeditionary case, which should be allowed all destroyers with a medical officer.

The available equipment for emergency work is easily kept in readiness, so that the medical officer formerly had considerable unoccupied time. This was quickly put to good use in various ways. On some destroyers the medical officer has charge of the decoding staff and stands a regular watch, while on others he helps with the commissary department as well. First-aid lectures are given at frequent intervals.

It is not an infrequent occurrence for the medical officer to render aid to survivors picked up by his ship. This is happily becoming more rare since the convoy system has been more widely adopted. Often these rescued men are suffering from wounds received by shells, or the result of the exploding torpedo in addition to the exhaustion due to exposure. One medical officer saved the lives of three sailors suffering from badly lacerated body and arm wounds, the result of shelling by a submarine. Another rendered valuable aid to several survivors who had been five days on a raft without food or water.

These are extreme cases. The mildly shocked cases, those unable to walk or speak when first rescued, are able after a change of clothing and the employment of stimulants to regain their strength in a few hours and are none the worse for their experiences. Some cases require hypodermic injections of strychnine and caffeine in addition to other attention before they are revived.

When his own ship was torpedoed, with one man killed and five injured, the medical officer was able to save the lives of the severely wounded. This ship did not sink. Another was not so fortunate when torpedoed, as the ship went down in five minutes and no medical work could be done, owing to the confusion and darkness. This medical officer was on a raft for 14 hours in midwinter before being rescued. Recently when a destroyer captured a submarine the wounded among the crew were cared for by a destroyer medical officer before they were brought to the base.

On the medical side the experiences are less interesting, though already two cases of pneumonia have been treated by one medical officer for several days on a destroyer before it was possible to reach a hospital. A few contagious diseases, as mumps and measles, have been encountered, but prompt isolation prevented their spread. One case of cerebro-spinal meningitis has occurred, which ended fatally.

[1] This article was written early in 1918. The outfit of instruments now depends on the medical personnel attached to a torpedo boat.

It is as little as can be done in an article of this nature to mention the way in which the chief pharmacist's mates or pharmacist's mates first class serving on destroyers are performing their duties under war conditions. The hospital corpsman on a destroyer is a very busy man. He acts as assistant to the medical officer, stands a decoding watch at sea, and in addition is assistant to the commissary officer. Only the best men in the corps should be assigned this duty, as the responsibilities are large. Most of them now on destroyers perform all duties assigned them in an exemplary manner.

Aside from the important medical duty encountered when operating in the war zone, the destroyers offer opportunity for the most exciting and interesting experiences that can occur to a person in the Navy at present.

Though the preponderance of allied war ships keep enemy surface craft from venturing far from their bases, they are unable to keep the submarine from searching the sea on its mission of destruction without warning. This submarine warfare necessitates that all navigation be carried on without lights, which greatly increases the risk of collision. Already three medical officers have been in collisions at sea. One has had the experience of having his ship rammed at night and sunk to the water's edge in three minutes. The ship was saved by the heroic efforts of part of the crew who remained on board and endured the cold and danger throughout the night.

The incidents and experiences related above as occurring to medical officers on destroyers in the war zone are but a few among the many daily occurrences. The duty is intensely interesting and arduous.

PSYCHIATRIC MATERIAL IN THE NAVAL PRISON AT PORTSMOUTH, N. H.

By A. L. Jacoby, Passed Assistant Surgeon, United States Naval Reserve Force.

With the large increase in the personnel of the Navy incident to the present war, there has likewise been a great increase in the prison population of the Navy, until the number of general court-martial prisoners to be cared for at Portsmouth, on February 1, 1918, was 1,646, an increase of over 650 per cent since April 1, 1917, and the population is increasing at the rate of about 200 per month. The monthly increase, at the present time, practically equals the total population on April 1, 1917. Nothing concerning the loss in a military way need be said here, except that this number represents the complement of one of our largest battleships and two destroyers in addition.

The naval prison is exactly similar to any State prison in that its inmates are there because they did something which the law says they must not do. The character of the man himself and the reasons for the commission of the forbidden act are too frequently not con-

sidered when he is sent to prison. An offense, military or moral, may have been committed for any number and variety of reasons, and there is in every case a reason. Very frequently, indeed, the act represents the more or less natural conduct of a disordered mind. The percentage of the mentally abnormal amongst prison population in general has been variously given by different writers. White (White, Wm. A., "Principles of Mental Hygiene," Macmillan Co., p. 143) says: "A considerable proportion of the prison population are, however, not normal in their developmental possibilities. Upward of 50 per cent as they are admitted have demonstrable disease at the central nervous system level. That is, they are mentally defective, psychotic, or have gross central nervous system disease, such as arteriosclerosis or syphilis. This does not include bodily diseases other than that of the central nervous system."

Psychiatric examination of naval prisoners was instituted about November 1, 1917, and the work had been undertaken, from the investigator's standpoint, as an attempt to, first, determine the incidence of nervous or mental disorder in general court-martial prisoners, and, secondly, to reach, if possible, a method of reducing the economic loss occasioned by military delinquency. The methods employed in the examination of the 150 cases here cited have been as thorough and complete as is possible, without too great interference with the routine of the prison. A careful family and previous history was taken from the prisoner himself, and, where possible, corroboration of the facts given was obtained by correspondence with institutions where the man had previously been confined. The measure of intelligence used is that of Terman, with certain natural omissions for men who had previously passed an examination at the recruiting station. Each case was examined neurologically, as well as psychiatrically, and, in many doubtful cases, a period of observation in the naval hospital was used in reaching a diagnosis. Special examinations, e. g., cerebro-spinal fluid, eye grounds, Wassermann, X-ray, etc., were used whenever indicated. The possibility of malingering is always to be borne in mind when dealing with the psychiatric problems of prisoners, and it is thought that these rather thorough methods serve to practically eliminate that factor.

In this series 3, or 2 per cent, appeared for examination on their own initiative; 75, or 50 per cent of them, were referred for examination by some official of the prison, usually one of the physicians who make the routine physical examinations upon admission; the remaining 72 cases, or 48 per cent, were not referred, but taken in routine as they were admitted. Twenty-five different offenses are represented, and these are shown in Table 1. It will be noted that the total number of offenses shown is greater than the total number of cases. This is due to the fact that certain men were sentenced for more than one offense.

TABLE 1.

Offense.	Number.	Per cent.
Desertion	53	31.9
Absence over leave	37	22.2
Scandalous conduct tending to the destruction of good morals	11	.6
Absence without leave	9	.5
Assault	8	.4
Sodomy	7	.4
Conduct to the prejudice of good order and discipline	6	.3
Disobeying lawful order of superior officer	5	.3
Drunkenness on duty	5	.3
Theft	5	.3
Sleeping on post	5	.3
Threatening to strike superior officer	2	.1
Murder	1	.06
Fraudulent enlistment	1	.06
Leaving post before being regularly relieved	1	.06
Striking and wounding a person in the Navy	1	.06
Absent from station aboard ship	1	.06
Forgery	1	.06
Refusing to obey lawful order of superior officer	1	.06
Destruction of public property	1	.06
Unlawful possession of property belonging to another	1	.06
Breaking arrest	1	.06
Neglect of duty	1	.06
Using obscene and profane language toward another person in the Navy	1	.06
Falsifying accounts	1	.06

It will be seen from the table that somewhat more than half, about 56 per cent, of the total offenses are of a military nature and are not of the character which would bring the individual into a civil court.

The division of the cases by the length of their service, i. e., the time elapsed between date of enlistment and date of arrival at the prison (not the date of the offense or the date of the trial) showed 50 to have had less than six months' service, 49 more than six months and less than a year, and 51 to have had more than one year.

Table 2 shows the cases by diagnosis.

TABLE 2.

Diagnosis.	Number.	Per cent.
Subnormal	34	22.6
Hysteria	18	12.0
Dementia precox	3	2.0
Manic depressive insanity	2	1.3
Anxiety neurosis	2	1.3
Paranoid state	1	.6
Depression (undifferentiated)	1	.6
Epilepsy	2	1.3
Chronic alcoholism	6	4.0
Cerebro-spinal syphilis	3	2.0
Psychopathic personality	8	5.3
Constitutional inferiority	9	6.0
Congenital syphilis	1	.6
Neurological:		
Tabes dorsalis	1	.6
Nerve injury	1	.6
Migraine	1	.6
Unclassified	7	4.6
No psychiatric condition	50	33.3

The proportion of nervous or mental disorders is thus seen to be two-thirds of the total examined. Even in this relatively small series of cases the proportion of the abnormal coincides closely with King's observations. He found in 1,000 prisoners that 65.4 per cent fell into abnormal groups. (King, Edgar, "The Military Delinquent," Mil. Surg. 37, Dec. 1915, pp. 574–578.)

SUBNORMAL.

In this group of 34 cases 17 different offenses appear; 6 of the group were sentenced for more than one offense. Of the total offenses 70 per cent were of a military nature, and 85 per cent of them were in the nature of conduct to be expected of the feeble-minded. For example, a boy 19, four months in the service, in leaving his ship for the usual overnight liberty, asks one of his companions if "it would be all right for him to go home for a week," and when his shipmate replies that he "can if he wants to," stays home a week and returns to find himself charged with absence over leave. This particular case grades about 9 in the intelligence tests, and the observation of his conduct in the prison would certainly not place him higher than that level. Five of these cases could not possibly be graded above the 7-year level. One was examined who can not write his full name. This large group, 22.6 per cent of the whole, should be eliminated at the recruiting station or at the training station.

HYSTERIA.

The second largest group is composed of the hysterics, and 5 of the 18 cases, or 2.7 per cent, may be said to have developed in the prison. Two of these are "twilight states," often described among prisoners, and sometimes classed as prison psychoses. They are included here for the reason that the hysterical basis is so prominent in them. It is of interest to note that the 5 cases developing in the prison were sentenced for moral offenses, while the remaining 13 are in prison for military offenses. None of this group was sentenced for more than one offense, and 10 of them are serving sentences for desertion. Eleven of the 18, or 61 per cent, are considered so gravely affected as to be of no use to the Navy, while 7, or 39 per cent, are regarded as useful, if handled understandingly aboard ship. In these 7 cases it is highly probable that the offense might not have occurred had the nature of the man's disorder been understood aboard his ship. The same degree of professional consideration is due one of these men, when he seeks advice about his nervous symptoms, as is shown a patient with gonorrhea, for instance. It too frequently happens that he is told that it is all his imagination, and the word is passed, usually by members of the hospital corps, that he is a "nut," with the ultimate result that the patient seeks relief in running away, feeling, as he does, that he is not understood.

DEMENTIA PRECOX.

The three cases of dementia precox call for no special comment, except that each case was definitely advanced upon admission to the prison. Two of them were in the service less than six months, so that it is very probable that they were insane when they enlisted. The third case developed in the Navy, and his offense occurred after the onset of the disease.

MANIC DEPRESSIVE INSANITY.

One of these cases is in the hypomanic phase, and the other is in the depressed phase. Both have histories of previous attacks before enlistment.

ANXIETY NEUROSES.

One of these cases developed in the service prior to the offense for which he was sent to prison. His offense is desertion, and it occurred in an attempt on his part to find relief for his miserable state of mind. The other case developed in the prison.

PARANOID STATE.

This case developed in prison, out of the man's attempt to justify the situation in which he found himself when he came to prison.

DEPRESSION (UNDIFFERENTIATED).

This man deserted in reaction to definite delusions of a persecutory nature. His psychosis had its onset after he had been in the service over five years.

EPILEPSY.

Two cases, one showing attacks of grand mal and one of the petit mal type, were found in subnormal boys. Both have had frequent attacks since infancy.

CHRONIC ALCOHOLISM.

The cases diagnosed chronic alcoholism are all men between 24 and 34 years of age, older than the average of the prisoners. Each has a history of long-continued excess, and two of them had been committed as inebriates to State hospitals before enlistment. All of them show signs of organic brain change.

CEREBRO-SPINAL SYPHILIS.

Each of these cases contracted syphilis in the Navy, and each has positive cerebro-spinal fluid findings. In each of them there are neurological signs, which first attracted attention to the case.

CONGENITAL SYPHILIS.

The one case of this condition is so stigmatized as to attract attention on sight. He is below normal in intelligence, and has positive cerebrospinal fluid findings.

NEUROLOGICAL CONDITIONS.

Here are included one case of tabes dorsalis, one of a partial, flaccid palsy of one leg, with marked trophic change, resulting from a nerve injury in childhood, and one case of migraine. All of these men are in the class of less than six months' service.

UNCLASSIFIED CONDITIONS.

In this group are included seven cases of very definite abnormality of the mental processes, but in which, an exact diagnosis did not seem possible. Six of the cases existed prior to enlistment and one developed since admission to the prison. All but two enlisted since the declaration of war.

PSYCHOPATHIC PERSONALITY.

Among the eight cases are six of the type often alluded to as moral imbeciles, one of the type usually called psychopathic exaltation, and one case of psychopathic depression. Only one of this group had been in the service more than six months, and each of them would easily be excluded at the recruiting office, after a very short examination.

CONSTITUTIONAL INFERIORITY.

There have been included in this group those individuals showing a moderate degree of intellectual inferiority and giving long histories of repeated offenses. All of them show serious defect in the emotional field. A large relative proportion of the serious offenses appear here; three cases of sodomy, one of theft, and one of assault. This group can be eliminated at the training station.

NO PSYCHIATRIC CONDITION.

In the group of 50 cases, classed as having no psychiatric condition, are 16 cases of temperamental difficulties, through which they have shown themselves to be unfit for the service, but there seemed insufficient evidence of any disorder to classify them in any of the other groups. Among the causes assigned by the men of this group for their commitment to prison, alcohol stands out most prominently, being given in 20 per cent of them; a "bad gang" appears next in 14 per cent; and "women" in 10 per cent.

CONCLUSIONS.

The real value to the service of the expenditure of energy in ascertaining the mental state of its prisoners lies chiefly in directing us to a method of saving what is otherwise an economic loss. In this series of 150 cases, 81, or 54 per cent, are men who clearly should have been eliminated at the recruiting or training station; 19, or 12 per cent, developed a mental disorder after enlistment. For the reduction of the prison population by one-half, then, a reasonably careful psychiatric examination at the beginning of the man's career in the Navy is necessary. This examination need not be directed toward an

exact diagnosis, but it should be in the hands of men trained in dispensary psychiatric work. Only a few minutes per man is required to detect the vast majority of this class, probably 80 per cent of them.

For the elimination of the 12.6 per cent which develop abnormalities of mind in the service a psychiatric examination should be made of every man awaiting trial by general court-martial before his trial. If he is found abnormal, he should be discharged from the service or sent to a psychopathic hospital, depending upon the result of the examination. It may be said that such a practice might act contrary to the deterrent principle of punishment as a part of military discipline; but surely the harm done in committing an insane man to prison far outweighs any objection on that score. Such examination may, at times, be impossible because of the location of the trial, but whenever possible it should be done. As a most valuable aid in this connection a note should be made in the health record of any man when he shows any peculiarity of conduct, no matter how trivial it may seem at the time. A note made in one health record aboard ship described peculiar conduct, then of very slight importance, but suggestive of a beginning psychosis. Four months later the man was tried at a navy yard and sentenced to the prison, where, upon arrival, he is a well-developed case of dementia precox. The most superficial examination before the trial might easily have convinced any medical officer of the existing psychosis, particularly with the aid of the previous note.

There should be at the prison an adequate psychopathic ward for the observation of suspects, and every man admitted should be examined neurologically and psychiatrically, as well as physically. Here the work should be done most thoroughly in order to eliminate possible malingering. Cases, abnormal when enlisted and hopeless so far as usefulness to the service is concerned, should be discharged as soon as possible, consistent with work of a character which reduces errors of diagnosis to a minimum; provided, of course, that they are not likely to become public charges. Those of this class, which require public care, should be sent to hospitals in the State from which they come. Psychoses developing in the prison should receive hospital care, and to the very small proportion in which the psychosis is of such a nature as probably to destroy the social usefulness of the individual after his sentence has expired there should be given a discharge before this usefulness is too greatly impaired.

In time of war, when all forms of energy must be conserved to the utmost, it is most highly desirable to eradicate expensive, nonproducing elements of the service personnel. It is a common observation aboard ship that this element forms roughly about 20 per cent of the ship's company. They are the men constantly on report and it is practically the same group which is always at sick call. The remainder of the men are striving hard and earning their full pay

every day. The undesirable portion tends to gravitate toward the prison or hospital, where they are a further expense. Much is possible to be done toward the reduction of that expense by the elimination of them as soon as possible in their naval careers.

THE HISTORY AS A MEANS OF DETECTING THE UNDESIRABLE CANDIDATE FOR ENLISTMENT WITH ESPECIAL REFERENCE TO MILITARY DELINQUENTS.

By A. W. STEARNS, Passed Assistant Surgeon, United States Naval Reserve Force.

That there is a need of a more satisfactory method of detecting undesirable candidates, and so of preventing their enlistment, is evidenced by the following statement from the report of the Judge Advocate General of the Navy for 1912 (p. 13):

DEFECTIVES.

Though the examination of prisoners is continued with much the same results as heretofore noted, no test has been developed of sufficient accuracy to be of very great practical use in recruiting in the direction of keeping out of the Navy those defectives who eventually find their way to prison.

The extent of the disciplinary problem in the Navy is further shown in the same report by the following:

Page 28 * * * the tables show that general and summary courts-martial and deck courts reviewed constitute a fixed percentage of the men in the naval service; general courts-martial approximately 2 per cent; summary courts-martial approximately 12 per cent; and deck courts approximately 9 per cent.

These figures do not include appearances at mast, which outnumber all others. The loss to the service through delinquency or lack of ability is shown by the following table (p. 10):

Discharged as undesirable for inaptitude or with ordinary discharge not recommended for reenlistment	756
Discharged with dishonorable discharge	1,000
Discharged with bad-conduct discharge	2,296
Total prematurely discharged	4,052
Total deserters for fiscal year	1,681
Grand total	5,733
Total number of men handled during fiscal year	72,885

From this it appears that 7.86 per cent of the total number of men handled are prematurely lost to the service. In other words, in order to get 100 men who will be of use to the Navy it is necessary to enlist 108. With a personnel of 250,000 this waste becomes appalling, for if outfit alone is considered, costing $60 per man, the waste would be $1,179,000 per year. If one adds to this the other expenses involved in recruiting and training these individuals, nothing more would seem necessary to arouse those in authority to take immediate steps for the more careful selection of recruits.

That there has always been a close relation between military service and delinquency can not be questioned. In former times this was taken as a matter of fact, and though fortunately the tendency has been for the better, there is still a popular impression that military service is an asylum to which rogues may flee.

The following newspaper clippings show the attitude of police courts toward the problem, and popular opinion is to quite a large extent formed and expressed by newspapers. These are merely casual clippings extending over a period of less than a month.

From a California paper:

Nov. 21. Bootlegger, promising to join Navy, is released. H. F., of C., pleaded guilty to "bootlegging," but asked to be allowed to join the Navy. He was released on his own recognizance and told to enlist.

Dec. 8. Paroled to enlist. Paroled from the * * * jail in order to become an aviator * * *, R. W., sentenced to a year for passing bogus checks, was rejected because of weak eyesight. W. declared that he would enlist immediately in another branch of the service.

Dec. 16. Thief dismissed so that he might join the Army. D. F. pleaded guilty here to-day on a charge of petty larceny * * * but an indictment against him charging forgery in the second degree was dismissed so he might enlist in the * * * of the United States Army. The magistrate said if F. actually entered the Army he would suspend sentence. (Rejected.)

Dec. 14. Ex-soldier is rum peddler. C. A., recently discharged from the United States Army * * * pleaded guilty to giving soldiers liquor. * * * Judge H. continued the case until Saturday, and in the meantime A. will try to reenlist in the Army.

From a Massachusetts paper:

Nov. 21. Ready to enlist, but court decides defendant must provide for wife and child.

Dec. 12. (Same case.) M. J. R., who was found guilty a few days ago on a charge of neglect of his wife and family, was called on continuance and given a suspended sentence of four months, with the understanding that he join the marines within a week's time.

Nov. 22. The next case was A. R., who in 1912 was arrested for breaking and entering. The young man's sister was on hand to plead his cause and assured the court that if given a chance he would join the Navy. He was allowed to get by on a fine of $25.

There is also a belief among us that military discipline will reform an incorrigible, and this belief is held by some officers who have never analyzed the problem. Modern advance in knowledge concerning delinquents has shown that they require a maximum of personal attention by those having them in charge. While *as a group* enlisted men have a maximum of supervision, there is no time to supervise *individuals*, and all will admit that in the present crisis military efficiency should not be hampered by these problem cases.

Following the above recital, it is fair to inquire as to present methods of recruiting to see what attempt, if any, is being made to exclude the socially unfit from the ranks. In an attempt to get only physically fit, the pendulum has swung far, till now it is almost true that recruits are selected solely on the basis of physical examination, and this

without adequate history, the first requisite for forming medical opinion. To be sure, the candidate is asked to fill out an application blank. This might be useful if properly used; but from inquiry in many directions, the filling out of this blank seems to have become entirely perfunctory. The questions on the blank bearing upon the problem of nervous and mental disease and delinquency follow:

Time at school, ... Age at time of leaving school, ... What is your trade, or at what have you been employed since leaving school? ..... Name and address of references, ... Have you ever had fits, internal piles, syphilis, bed wetting, insanity, stricture, or private disease, or been a victim of the drug habit? ..... Do you drink intoxicating liquors? If so, to what extent? ..... Have you ever been arrested? If so, for what? ..... Have you ever been in the reform school, or jail, or penitentiary, or have you ever been convicted of any crime? .....

The presence of the above questions in the application show that their need has been recognized; but any man who has practiced medicine or who has dealt with the class of people which the above is meant to detect, and so, I presume, exclude, will recognize at a glance the folly of hoping to get material facts from the perfunctory filling out of the above by the candidate himself, or by a petty officer in the presence of other candidates. Those who will write the truth do not need the above questioning, and those who need the above questioning will not write the truth. However, when a man is questioned alone, face to face, by a trained person interested in getting positive information, the facts can be obtained in a vast majority of cases, as will appear below.

During the past few months the writer has been interviewing every recruit at a naval training station. The method and general results in a series of 2,000 cases have been published in another paper, in the Journal of the American Medical Association. For the most part but a minute or two has been taken for each recruit, though when a clew was found more time has been available.

The following 20 cases, constituting 1 per cent of the whole series, are given in very brief abstracts. They are selected cases, taken to illustrate the point at issue, and not because of their outcome, and they are by no means all of the undesirable or abnormal in the series, but are the 20 most striking cases.

(1) H. W. A. No. 6119. Age 18, A. S. Seventh grade at 14 years. No regular occupation. At 12 sent to G. J. Reform School. Discharged for assault on teacher. Sentenced to the W. State Reform School. There until just prior to enlistment. Three arrests for running away. Diagnosis, defective delinquent. Outcome unknown.

(2) R. A. No. 1755. Age 20, A. S. Seventh grade; 2 years in sixth. No regular employment. For past two years a freight car

vagrant, begging and stealing a living. Denies arrests. Diagnosis, feeble-minded. Outcome: Bad conduct discharge for immoral conduct two weeks after enlistment.

(3) F. B. No. 1760. Age 21, A. S. Fifth grade at 15 years. For past six years a vagrant, one week being longest steady employment. In the Navy before; deserted and sentenced to Portsmouth Naval Prison. Discharged. One year in M. Reform School. Arrested for vagrancy at 17. Diagnosis, feeble-minded. Has run away three times, but has either surrendered or returned prior to being called a deserter. While away, swindled a local Y. M. C. A.

(4) H. B. No. 15. Age 18, A. S. Third year at high school. No regular occupation. Arrested in 1914 for burglary. Since; 9 arrests for forgery, incorrigibility, and burglary. Sentenced to W. Reform School. Returned to court as incapable of reform on October 18, 1917. Enlisted in Navy the next day. Diagnosis, no mental disease, but obviously unstable and neurotic. Reform school gives bad report and can not recommend for service. Bad-conduct discharge on account of record. Arrested one month after discharge from Navy. Alleged to have passed 150 bogus checks.

(5) J. A. B. No. 1776. Age 28. F. 3 C. Married and separated. Fifth grade at 18 years, and two years in each grade. No regular occupation. Discharged from the United States Army in 1911 under an assumed name. Can not give reason. Bad-conduct discharge from United States Army in 1916 for desertion. Since has served 15 days in prison for disturbing the peace. Diagnosis, feeble-minded. Transferred.

(6) I. C. No. 821. Age 33. Sea. Single. Fifth grade. A sailor. A drunkard. Came to station deeply intoxicated after a spree. Denies arrest, but admits chronic alcoholism. Diagnosis, chronic alcoholism. Deserted a few weeks after enlistment.

(7) C. E. C. No. 1296. Age 20, A. S. Seventh grade at 14 years, two years each in first and second grade. No regular work. Vagrant for the past two years; riding all over the country on freight trains. Denies arrests, though states he has frequently spent night in jail for lack of other place to sleep. Diagnosis, undetermined. Attitude suggests dementia precox or psychopathic personality. Transferred.

(8) G. D. E. No. 1884. Age 19, A. S. Single. Sixth grade at 14. No regular work. Freight car vagrant for the last four years. Has served in an institution, but claims not to know the name. Denies arrests. Diagnosis, feeble minded. Reported slow in drill.

(9) J. J. E. No. 1973. Age 19, A. S. Single. Eighth grade at 12 years. For the past three and one-half years has been riding about country on freight trains. A hobo for the last three years. Denies arrests. Diagnosis, undetermined. Stammers, and is obviously peculiar. Transferred.

(10) F. H. No. 1978. Age 21. Single. F. 3 C. Seventh grade at 14 years. No regular work. A vagrant for several years. Arrests in Buffalo, Detroit, Cleveland, Chicago, Akron, Ohio, etc., always for vagrancy. Diagnosis, undetermined. Has an ankylosis of left elbow joint, which he concealed from examiner. Two weeks after arrival, says he feels fidgety, and doubtful if he can make it. Transferred.

(11) E. L. No. 1710. Age 18, A. S. Single. Seventh grade at 16, two years in third grade. No regular work. Riding freights continuously for past four years. One arrest for vagrancy. Diagnosis, feeble-minded. Bad-conduct discharge for immorality and stealing two weeks after arrival.

(12) E. E. M. No. 779. Age 23, A. S. Single. Fourth grade at 14, two years in third grade. No regular work. Expelled from school for quarreling with teacher. One arrest for robbery. No mental disease made out. Transferred.

(13) R. M. No. 37. Age 29. Landsman for baker. Divorced. Fourth grade at 15. Odd jobs as a barber. Deserted wife six months after marriage. Two arrests for fighting, once as a suspicious character. Diagnosis, subnormal. Discharged for fraudulent enlistment.

(14) J. H. M. No. 786. Age 33. Landsman for cook. Married. Seventh grade, two years in the fourth. Several arrests for vagrancy, and served eight years in the I. State Penitentiary for burglary. Married and left a pregnant wife with no support when he enlisted. Diagnosis undetermined. Looseness of thought and manner, and religiosity suggest dementia praecox. Wrote unauthorized letter to President. Transferred.

(15) J. M. No. 1759. Age 18. A. S. Single. Seventh grade at 16, two years in first and second grades. No regular employment. Arrested at 16 for fighting, and before that for truancy. Arrests at Toledo, Ohio, and Oklahoma City for vagrancy. Riding freights for past year. Diagnosis, feeble-minded. Transferred.

(16) L. O. No. 105. (An assumed name.) Age 18. A. S. Single. Eighth grade in reform school. No regular work. For past two years in industrial reform school on account of trouble with parents. Such a liar that history is unreliable. Diagnosis, constitutional inferiority. Medical survey following an assault.

(17) M. P. No. 946. Age 18. A. S. Single. Seventh grade, repeated two classes. No regular work. In charge of parole officer when enlisted. Rode from Iowa to Texas on top of a passenger train, fell off and broke his arm. Concealed this and enlisted. Diagnosis, feeble-minded. Medical survey. Ununited fracture of radius.

(18) A. T. No. 1479. Age 18. Single. Eighth grade, two years in the seventh. Odd jobs only work. Arrests for truancy and running away from home. Short time in detention home. Diagnosis,

defective delinquent. Bad-conduct discharge for stealing two weeks after enlistment.

(19) P. V. No. 1769. Age 21. A. S. Single. Fifth grade at 13, two years in fourth. Odd jobs. One year in a truant school. Diagnosis, feeble-minded. Deserted month after enlistment.

(20) H. H. W. No. 1846. Age 20 (actual age 17). A. S. Single. Eighth grade, two years in fifth. No regular work. At time of enlistment a deserter from United States Army. Three previous arrests, one for speeding, one as a suspicious character, one for assaulting an officer in a saloon. A vagrant at time of enlistment. Diagnosis, defective delinquent. Deserted within three weeks of enlistment.

On account of rapid transfer it has been impossible to follow all cases, but the above list includes 80 per cent of the bad-conduct discharges and 45 per cent of the desertions from this station during the past quarter. The number is too small to warrant the drawing of wholesale conclusions, but indicates the relation of mental disease to delinquency. It will be noticed that all cases occur in the classes of recruits which are unskilled. In other words, in any group where discrimination is made in enlistment, undesirables are climinated The above histories, taken from the patients themselves with no coercion, show the recruits to have been a failure in civil life, and so there is every reason to predict their failure in a military career. It seems proper to make certain recommendations from experience in taking several thousand such cases.

(1) All courts should be warned against conniving in the enlistment of socially irresponsible people.

(2) A brief social history should be taken by an interested and skilled person on every applicant for enlistment. To do this will require some special skill, and it is too much to expect that an untrained enlisted man will do it well. Such a person should have some training in social investigation and might very well be a social worker.

(3) Whenever, in taking such a history, the applicant is far from home without adequate explanation, or gives a history of backwardness in school, low economic efficiency or delinquency, his case should have special investigation.

(4) Such special investigation should include at least a police report, investigation of references, and mental examination. All of this could be done by a neighboring psychopathic clinic, if such is at hand, and would be required in less than 5 per cent of the applicants.

(5) Whenever there is found to be a history of backwardness in school, irregular employment, and delinquency, the applicant should be rejected forthwith, for there is very little chance of his being desirable.

(6) The principal of specialization must be more adequately recognized if a high grade of psychiatric work is to be expected.

HISTORICAL.

A QUAKER PRODIGY.

THOMAS YOUNG, M. D., 1773–1829.

It is with good reason that the world is skeptical about the permanence of virtue in young paragons like the youth portrayed in "Sandford and Merton," and we liberally discount the final success of all those juvenile mathematicians, calculators, and inventors whom newspapers and the cheaper magazines exploit from time to time. Except when they are musical, how rarely do infant prodigies grow up to fulfill the early promises of achievement which astonished the neighbors and made parental hearts thrill with joy and pride. We wonder what becomes of the abnormal little creatures, for they cease to be mentioned even in the chronicles of their native towns. They must atrophy, undergo some process of involution, be self-digested, die intellectually, for of course they do not mature.

The slow-moving world, with its painful, laborious advances and its often questionable improvements, would unexpectedly dash ahead by the most terrifying leaps and bounds if time really brought to fruition the phenomena portended by infant prodigies. How fatal this would be to the honest, plodding endeavor on which we rely for the accomplishment of life's serious tasks. How each successive generation would loll in supine idleness, waiting for the birth of a genius and expecting progress as the easy gift of that genius, and how terrible would be the retrogression, what lacunæ would threaten, when there was an undue interval between meteors.

But because all general postulates have to be modified, and since rules are best illustrated by their exceptions, history furnishes occasional examples of youthful precocity that did not end in disappointment. Because international law and belligerent rights are so much in the public eye to-day, we may appropriately cite Grotius, the Dutch publicist, who attempted to create an international conscience, as a case in point. Huig van Groot, or Hugo Grotius, of Delft, Holland, wrote good Latin verses at 9, and at 12 years of age had fitted himself to enter the University of Leyden. When only 15, Grotius served as member of a diplomatic mission to France. By the time he was 20 he had edited versions of Cicero, written Latin dramas of merit, and been selected by the United Provinces to put into book form the story of their long struggle with Spain.

Grotius was 21 when he composed his famous treatise "De jure prædæ," and four years later became advocate general of the fisc for Holland and Zealand. Grotius was a remarkable instance of unusual ability manifested early and developing progressively through life. The most substantial basis of his claim to the notice of posterity is the work entitled "De jure belli," printed in his forty-second year. In the form in which it was published this was indeed the work of mature years, but the essential ideas therein set forth had been amply foreshadowed in the more exuberant and less guarded utterances of early manhood. It has been said that "in the annals of precocious genius no greater prodigy" than Grotius has been recorded. We invite the reader's attention to the accomplishments of Thomas Young, and claim that this member of the medical profession comes nearer justifying the title of universal genius than any other personage of whom we possess a veracious record.

Thomas Young was the first of 10 children born to Thomas and Sarah Young, worthy Quakers of Somersetshire. He was carefully and strictly brought up according to the tenets of this sect, and, though later in life he diverged from their mode of worship and practice of religion, he ever remained a devout Christian and readily recognized the valuable aid to the development of character and mentality which he owed to the Quaker rule.

A catalogue of Young's accomplishments would make dull reading, yet his life is so crowded with achievements worthy of record that it is impossible to do more than advert to them in the limits of a magazine article. Young's biographer and the principal authority on his life and work is Dean Peacock, of Ely,[1] who, writing 25 years after Young's death, scarcely finds sufficient room in 500 octavo pages to set forth the permanent contributions to science made by the subject of the memoir, and has no place for those details of the daily life and personal habits of the great man which for many readers possess far more charm than the exhaustive exposition of titles to fame. However, no contemporary of Young who appreciated his talent and realized to what an extent he had been misunderstood and underestimated by the bulk of his contemporaries could conscientiously have diverged from the task of establishing Young's position in the scientific world for the sake of presenting us with a picture of the man's personality. Besides, Dr. Peacock's work was undertaken at the earnest solicitation of Mrs. Young, who was naturally far more desirous of having her husband's reputation set on a solid foundation than of furnishing entertainment to the general reading public by the recital of all those minor incidents, peculiarities, whimsical sayings which give popular charm to biography.

[1] Life of Thomas Young, M. D., F. R. S., etc., by George Peacock, D. D. John Murray, Albemarle Street, London, 1855.

Though it is clearly not the biographer's primary intention to throw any sidelights on the character and personality of the great man, yet we learn from him that he was simple and unostentatious, supremely modest in estimating his own ability, and different in many ways from the popular conception of a scientific genius. Young was fond of dancing and horseback riding and enjoyed mixing in society. He was not overbearing or sententious in the expression of his opinions, but on the other hand he was not above feeling a certain relish in startling his hearers by some unexpected statement, and he greatly delighted in an argument and could stick to a point with truly British obstinacy. Nothing in Young's life suggests that he considered himself endowed with unusual mental powers. He invariably ascribed his success to persistent, untiring labor and to the determination to go to the bottom of every subject whose investigation he undertook. Young was frequently inveighed against, constantly misrepresented, often misquoted, and was fully appreciated only by the few, but his spirit was never embitterd, he never departed in public or private utterance from that courtesy, dignity, generosity, liberality, patience which mark the great mind, the perfect gentlemen, the true Christian. It is seldom that the dispassionate and critical eye of a succeeding generation can read the epitaph of a great man without suspecting that the encomiums bestowed upon the dead were inspired by family love and the admiration of friends, rather than by the unbiased judgment of his contemporaries, but the tablet in Westminster Abbey, set up to the memory of Thomas Young, seems to say too little rather than too much.

Sacred to the memory of

THOMAS YOUNG, M. D.,

Fellow and foreign secretary of the Royal Society,
Member of the National Institute of France;
A man alike eminent
In almost every department of human learning.
Patient of unintermitted labour,
Endowed with the faculty of intuitive perception,
Who, bringing an equal mastery
To the most abstruse investigations
Of letters and of science,
First established the undulatory theory of light,
And first penetrated the obscurity
Which had veiled for ages
The hieroglyphics of Egypt.

Endeared to his friends by his domestic virtues,
Honoured by the world for his unrivalled acquirements,
He died in the hopes of the resurrection of the just.

Born at Milverton, in Somersetshire, June 13th, 1773,
Died in Park Square, London, May 10th, 1829,
In the 56th year of his age.

Thomas Young as a boy was not a bookworm, pure and simple, but, having apparently been born with an insatiable thirst for knowledge of every kind, he had little or no time for the ordinary pastimes of youth, and apparently it was not until he had reached adolescence that he found the leisure necessary for social intercourse with his fellow men. At 2 years of age Young was able to read with considerable fluency. By the time he was 4 he was familiar with Watt's Hymns and had read the Bible through twice. According to his own testimony Young at 6 had learned the whole of Goldsmith's "Deserted Village" by heart (he accomplished this in odd moments in a period of six weeks), but his grandfather has testified in writing that Young repeated the poem to him correctly, with the exception of a word or two, before he was 5. Young was a great favorite with his grandfather, who did everything in his power to encourage the boy's love of learning and to direct his taste for study into the proper channels. "I well recollect," said Young, "the distich which he used constantly to repeat to me,

> 'A little learning is a dangerous thing,—
> Drink deep, or taste not the Pierian spring.' "

At the age of 7 Young was studying Latin, Greek, and mathematics. Referring to a capable teacher under whose influence he passed when about 13 years of age, Young says:

> He had made also an electrical machine, which I very frequently used. I was in the habit of grinding and preparing various kinds of colors for him, which he used to sell to the boys and to others; from him likewise I learned the first principles of drawing, and copied under his directions several specimens from the copperplates of a book entitled The Principles of Design. He was also a bookbinder, an occupation in which I assisted him. After he left the school I succeeded to some of his employments and perquisites, and I used to sell paper, copperplates, copy books, and colors to my schoolfellows, by which means I contrived to collect in 1786 as much as 5s., which, added to 10s. 6d. given me by my parents, enabled me to buy some Greek and Latin books, which were sold to me by Mr. Thompson at extremely low prices, and likewise Monotanus's Hebrew Bible, for which I gave 5s.; for I was at that time enamored of oriental literature, and I had already read through Buxtorf's Compendium, and Taylor's Tract at the end of his Concordance; and before I left Compton School I had succeeded in getting through six chapters of the Hebrew Bible.

Before the age of 14 Young had taken up the study of Hebrew, Chaldee, and Syriac, but he gradually abandoned Oriental languages and concentrated his attention on Greek and Latin, French, Italian, mathematics, natural philosophy, botany, entomology, and English literature. "The number of books which he read was very small, but he adhered strictly through life to the principle of doing nothing by halves. Whatever book he began to read he read completely and deliberately through; whatever study he commenced he never abandoned; and it was by steadily keeping to this principle, a most important one in education, that he was accustomed, in after-life,

to attribute a great part of his success, both as a scholar and a man of science."

Young was a great favorite with his uncle, Dr. Richard Brocklesby, a prominent physician of London, who made him his protégé and exerted himself in every way to prevent the young man from being spoiled, either by the consciousness of his ability or the wonder and adulation which he might provoke in others.

It was, perhaps, a fortunate circumstance for him that the modest station in life of his parents and connections, and the severe habits of the sect to which they belonged, saved him in some degree at least from the misfortune of being paraded as a prodigy; a fate to which wonderful boys have been more or less commonly exposed, in order to gratify the impatient vanity and ostentation of their friends. (Peacock.)

When Young was about 16 years of age his studies were interrupted by a serious illness "which seemed to threaten consumption." The patient was twice bled, and strictly confined for a period of two years to a diet of milk, buttermilk, eggs, vegetables, and very weak broth.

When Young was 19 his general education at school ceased. By this time he wrote fluently in Latin and Greek and was more than ordinarily well versed in the subjects already catalogued. Dr. Peacock ascribes Young's success later in life "to the peculiar constitution of his own mind; to his great industry; to the conviction, which he always felt, that what one man had accomplished another might accomplish also; to the determination of mastering every branch of knowledge whose acquisition he thought necessary or desirable.

"He had little faith in any peculiar gifts of genius, believing the original difference between human intellects to be much less considerable than it was generally supposed to be. His temper, also, in early youth was singularly unruffled and tranquil; he had no boyish tastes or amusements; he was seduced by no dreams of the imagination from the assiduous cultivation of the understanding."

In the autumn of 1792 Young commenced the study of medicine in London, influenced by the example and wishes of his uncle, Dr. Brocklesby. In 1793 Young presented to the Royal Society a memoir expressing his views on the capacity of the eye to change its focal length so as to be adapted for far and near vision. Young claimed that these changes occurred in the crystalline lens through the action of minute muscular fibers, which he fancied that he had discovered during the course of the dissection of the eye of an ox. The memoir was published in the transactions of the Royal Society, and on the strength of it Young was elected a fellow of the society in the following year.

While wrong in his contention that the focal changes of the eye were due to muscular fibers in the lens, Young was so absolutely in keeping with the ideas of his own time that John Hunter, the greatest physician of his day, immediately claimed the discovery as his own

and charged Young with plagiarism, but died before he had completed the lecture designed to set forth his views. The experiments of Hunter's successors seemed to prove that in the adjustment of the eye to different distances it is the curvature of the cornea and the length of its axis and not the crystalline lens which is changed. This startling announcement at first induced Young to withdraw his original opinion, but, later, after painstaking experiments and carefully measuring many eyes—both those which had been operated on for cataract and those which had not—he *returned to his original contention that accommodation for far and near vision depended on changes in the lens.*

In October, 1794, Young took up the study of medicine at Edinburgh and a year later went to Germany and matriculated at the medical school at Göttingen. Here, in addition to his medical studies, Young went in extensively for drawing, dancing, and equitation. He was passionately fond of horseback riding, and this fact, combined with his great muscular power, accounts for the marked proficiency which he attained. The riding schools of Göttingen were at that time second only to those of Turin, and Young found there opportunity to engage in the most daring and difficult feats. Writing to his uncle at this time, Young says: "I have this morning been upon the back of the Springer. To mount this terrestrial Pegasus is considered here something like *summi in re equestri honores*, and is seldom attained without long practice. I finish my lessons this week, and look back with satisfaction on the health and amusement which have repaid my time and money. It might, perhaps, be more useful to me to take some instructions how to sit in a doctor's chariot; but it is impossible to possess any qualification which one may not want, and capabilities are but light burdens. We have another fashionable exercise, which I think adequately corresponds to the athletic schools of the ancients—vaulting on a wooden horse in various positions; and I am much more known among the students for excelling in this than for writing Greek, of which they have little knowledge and not much respect."

Young was 23 years of age when he passed his examinations and was created Doctor of Physic, Surgery, and Midwifery by the faculty of Göttingen, after submitting the necessary theses and dissertations and undergoing an oral examination at the hands of four examiners, who sat round a table loaded with cakes, sweetmeats, and wine, of which they partook liberally while quizzing the candidate on surgery, anatomy, materia medica, physiology, and other branches of professional knowledge. "On the 16th July, he proceeded with his *praeses* (Wrisburg) and his two opponents (Weber and Nöden) to the summer auditorium, where he read a short thesis, called a *lectio cursoria*, the subject of which was the human voice; disputed according to the

forms; was complimented on his performance; and, after reading something like a prayer, was married to Hygeia, and created Doctor of Physic, Surgery, and Midwifery.

"The only fragment of this *lectio* which has been preserved is printed at the end of his dissertation, professedly with a view of filling up some pages of the last sheet, which would otherwise have remained unoccupied. We there find an alphabet of 47 letters, designed to express, by their combination, every sound which the organs of the human voice are capable of forming, and thus adaptable as an alphabet for all languages. It is distributed into 16 pure and 5 nasal vowels; 10 pure, 3 nasal, and 1 mixed, semivowels; 3 explosives, 6 susurrants, and 3 mutes. Whatever were the bases upon which this scheme was formed, it is evident from reference to it in his correspondence, that it was much in his thoughts; and he assures us that it was in connection with inquiries upon the powers of vocalization of the organs of the human voice, and in order to form a perfect conception of what a sound was, that he was conducted through a series of experiments and observations on the theory of the formation of sound and the laws of its propagation, to the consideration of analogous propositions respecting the theory of light, which became the foundation of his greatest discovery."

After a year's travel in Germany Young returned to England and became a student at Cambridge. In this same year he was elected fellow of the Linnaean Society on the strength of his description of a new species of opercularia—a plant from Australia.

Dr. Young began the practice of medicine in London in the year 1800, and continued an active practitioner up to the time of his death from calcareous degeneration of the aorta in 1829, but in spite of earnest effort and many real sacrifices to that end he never became what is commonly called a successful physician. The reasons for his failure are not discreditable to him nor are they hard to understand. The youthful years devoted wholly to study and lacking the ordinary pursuits and associations of boyhood could not fail to influence later life, and to some extent to unfit him for the quick understanding of the peculiarities of human conduct and put him out of ready sympathy with the mental side of his patients. Another reason for Young's failure to become popular as a medical father confessor to the well-to-do of the London world was that in him "the native hue of resolution sicklied o'er with the pale cast of thought" made no appeal to those patients whose confidence can only be won by a studied bedside manner and all those tricks and devices which are necessary to make the practice of medicine a paying business. It is interesting in this connection to note that, though not popular with patients, Young was sufficiently, nay, distinctly successful in the treatment of disease. In 1811 he was elected one of the physicians

to St. George's Hospital and retained this position to the end of his life. The apothecary of this hospital is reported to have made the remark that more patients were discharged cured from Dr. Young's service than from that of any other of the attending physicians, though they all outranked him as a fashionable physician and were credited with a greater capacity for *energetic* treatment. A testimony of similar tenor was given by Young's successor on the staff of the hospital.

Vigorous practice was the rage in Young's day, and a man who waited patiently on nature and deemed it his duty to take no steps that were not based on careful observation naturally passed for a mere philosopher, an indifferent healer, by comparison with that lively, bustling school, whose free use of calomel and prompt recourse to the lancet always insured immediate and visible results of one kind or another. Dr. Young was aware of his failure to measure up to the standard of popular requirements and appreciated that to be known as a dabbler in science, an investigator, a man of hobbies, could not fail to be prejudicial to his reputation as a practical physician. It was for this reason that not a few of his scientific reports were made anonymously, and it was on this account also that he resigned from his position as professor of natural philosophy at the Royal Institution. His very abilities seemed to disqualify him for the position of teacher. His hospital clinics were poorly attended, and he was extremely unpopular as a teacher, because his grasp of every subject was so comprehensive and rapid that his scholars could not keep up with him. He failed utterly to appreciate their difficulties and seemed constantly to slur over those very topics on which they were most anxious for him to dwell at length. All things considered, however, it is fortunate that, owing to his gentlemanly but cold demeanor, his reserve, his entire lack of that air of solicitude so dear to the patient, Dr. Young had ample time to prosecute those studies and researches which resulted in such real and tangible benefits to the progress of science.

In 1813 Dr. Young published his Introduction to Medical Literature and system of Practical Nosology. The appendix to this work contains a "Sketch of animal chemistry" translated from the Swedish of John Jacob Berzelius, one of the chief founders of the chemical theory of radicals and the successor to Lavoisier in the establishment of a system of chemical nomenclature. Young had no knowledge of the Swedish language until the desire seized him to become acquainted with the works of Berzelius. As Dr. Peacock very forcibly puts it: "A grammar and dictionary, a knowledge of German and of the general structure of languages, aided by a perfect familiarity of the subject, and his usual sagacity were sufficient to guide him" in this undertaking. That the translation was well done and satisfactory

to Berzelius is amply demonstrated by the letter of that illustrious chemist in which he thanks Dr. Young for the service rendered him and felicitates him on the scholarly accuracy with which the work was done.

Before this, however, Dr. Young had published an essay "On the Theory of Light and Colors," "An Account of Some Cases of Production of Colors," and "Experiments and Calculations Relative to Physical Optics." It is to the contents of these memoirs that Young owes his place in the temple of fame. Up to this time Newton's corpuscular or molecular theory of light had been practically undisputed for two centuries, a remarkable illustration of how in science, just as much as in religion, men's minds may be subjugated or blinded by authority. While Huyghens had conceived an adumbration of the idea of undulations, it was Young who in the study of colored rings established the principle of the interference of light, which was later confirmed and popularized by Augustin Jean Fresnel and served to establish the undulatory theory of light. As a matter of fact, in regard both to interference and diffraction, Fresnel's careful work, mathematically more complete than Young's demonstrations, had been anticipated by the latter by a number of years, as Arago has testified. In a letter to Dr. Young, accompanying a presentation of a Memoir on Polarized Light, Dr. Fresnel uses the following graceful language: "But, if anything could console me for not having had the advantage of priority, it is that it has brought me into contact with a philosopher who has enriched physical science with so great a number of important discoveries, a circumstance which has not a little contributed to increase my own confidence in the theory which I have adopted." In 1825 Fresnel was elected one of the 50 foreign members of the Royal Society on the strength of his important discoveries relating to light and heat, and in 1827, just as Fresnel was receiving the Rumford medal, Dr. Young was elected one of the foreign associates of the Academy of Science, Paris, in the place of Volta.

It is a curious and noteworthy fact that while Dr. Young's writings on philology were fully appreciated in Great Britain, and, while his work in connection with the interpretation of the Rosetta stone was championed and gloried in by his compatriots, some of whom may even have been tempted to exaggerate his accomplishments in deciphering hieroglyphics, it was from two Frenchmen, Arago and Fresnel, that he received the most valuable recognition and indorsement in regard to his optical discoveries. Lord Brougham, writing at length in the Edinburgh Review, poured scorn and contempt upon Young's hypotheses, and so effectively held him up to the derision of his countrymen that for years Young received no credit for what he had done. It is true that Young replied to the

bitter attacks made upon him in the Edinburgh Review, and amply vindicated his position and rebutted the charges of his adversary, but no steps were taken to promote the circulation of his printed answer, and it attracted little or no attention and had scarcely any readers; in fact, it is said that only one copy of his justification was ever sold! It would seem very remarkable that the scathing attack of the Edinburgh Review should have succeeded in discrediting Young's work for a number of years, were it not for the fact that the whole subject of his investigations was too abstruse and too difficult to appeal to the general reading public, and even the small and select body of scientific men were thrown off the scent by the ease with which Young handled his subject, and by his failure to use the more elaborate methods of demonstration, which he would, doubtless, have employed had the problems been as baffling to him as they were to the majority of his contemporaries.

It must not be supposed, however, that Young was lacking in friends and supporters. On the contrary, some of the ablest and most talented men of his day were numbered among his admirers and backers, of whom may be mentioned Sir Walter Scott, Humboldt, Canning, the Duke of Richmond, and Sir Humphrey Davy.

Dr. Young's archæological and linguistic researches, his contributions to the Quarterly Review and the Encyclopedia Britannica may be passed over with the brief comment that they were works of a high order, which served in some measure as a preparation for the greater achievements connected with his interpretation of Egyptian hieroglyphics, but they must be taken into account, also, as evidences of his great versatility.

When Napoleon Bonaparte entered upon his famous campaign in Egypt, in 1798, he had with him numerous artists and archæologists who undertook researches in the history of the country. In 1799 Broussard, an army engineer, stumbled upon a small stele or shaft of black basalt a few miles from the town of Rosetta, in the vicinity of Alexandria. Carved upon it was a decree of praise for Ptolemy V and his wife, Cleopatra, voted by the priests assembled at Memphis. The decree is written in Greek, in hieroglyphic or hieratic characters, and in the demotic or enchorial. Unfortunately, while the Greek and demotic versions were in a fairly good state of preservation, a considerable part of the hieroglyphic text was badly mutilated, which added enormously to the difficulty of deciphering. At the conclusion of the Greek inscription it is stated that the other two inscriptions have the same meaning.

At the cession of Alexandria, in 1801, this now world famous stone was acquired by the British Government and was set up in the British Museum, becoming the key to all subsequent scientific investigation of ancient Egypt. Among the first scholars to turn their

attention to the Rosetta stone (1802) were J. D. Akerblad, a Swedish orientalist attached to the embassy in Paris, and Silvestre de Sacy. Neither advanced very far. In 1814 Young attacked the problem, utilizing the very limited discoveries made by the two earlier investigators. A report of what he accomplished, with his conjectural translation of the enchorial inscription was printed anonymously in 1815. It is interesting here to note that already at this time de Sacy wrote to Dr. Young, cautioning him about the probable unethical behavior of Champollion and of the strong likelihood that he would pretend to priority in any successful future translations of the Rosetta stone. It is not easy for a person with no pretense to Egyptian lore to determine the proportion in which credit should be given to Dr. Young and to Champollion. Unfortunately, during the lifetime of these men, each a scholar of eminence and renown, their claims were championed by their fellow-countrymen on strictly national lines, as if France and England were seeking to claim the honor of having found the key to the interpretation of the Rosetta stone. This much can be positively affirmed. Champollion was an Egyptologist. His interest in Egypt dated from when he was 10 years old. His entire life was devoted to the most painstaking and profound study of everything relating to the subject, and the example of his industry and his truly wonderful attainments did more to put this branch of learning and research on a solid foundation than the combined efforts of all his contemporaries. He is undoubtedly entitled to the credit of finally and fully deciphering the Rosetta-stone inscriptions. On the other hand it seems incontestable that Champollion had scarcely advanced much beyond Akerblad, and, also that he was following that scholar's line of research until Young's discoveries and Young's method of attacking the problem came to his knowledge. Those discoveries and that method were immediately taken advantage of by Champollion, who, with this as a foundation, attained the most brilliant and marvelous results. Whether or not the great Frenchman was guilty of a certain disingenuousness and lack of candor, the present writer can not say, but there was documentary evidence to show that some of his compatriots thought him not above suspicion. There is good ground for believing, too, that Young was the first to appreciate the value of the phonetic signs. He announced that the demotic characters are not alphabetic but symbols originally derived from hieroglyphics which are themselves not words but phonetic signs, conclusions which Champollion announced five years later as originating with him. Young identified but a limited number of hieroglyphics, and, through lack of time or desire to devote the great amount of time that would be necessary to success, he did not utilize, as he might have done, the valuable aids to interpretation which he had himself originated. Young lacked the opportunities

and facilities available to Champollion. Young was a practicing physician, a visiting attendant at a large city hospital and interested in a wide variety of other studies. Champollion, on the other hand, was a professed Egyptologist, whose one purpose in life was to further the accumulation of knowledge on the one subject of his chosen career.

It now remains to summarize briefly the other lines of research with which Young busied himself. He was the first to offer a plausible explanation of color blindness, and his theory was adopted and elaborated by Helmholtz, who pronounced his forerunner "one of the most clear-sighted men that ever lived." He gave the first description on record of astigmatism. He was an authority on shipbuilding, gas illumination, and life insurance. He served for a long time as superintendent of the Nautical Almanac and secretary of the board of longitude. He was secretary to the commission for ascertaining the length of the seconds pendulum. He was an authority on the subject of tides.

In conclusion it remains to be said that Thomas Young was in person "the handsomest of all the great physicians," and he was by long odds the best educated man of his time. His love of the classics, and especially of the Greek language, was a source of pleasure to him through life. He was married in 1804 to Miss Elizabeth Maxwell, a lady of good family and standing. The marriage was an extremely happy one. Toward the close of his life Dr. Young and his wife traveled extensively on the Continent of Europe, their sojourn in Italy being particularly enjoyed. The following retrospect contained in a letter to a friend is highly interesting: "I do not believe that you are much the older for anything that occurred when you were a boy; nor do I think that I should have been the worse in health if I had been less rigid in my regimen. It is well for me that I have not to live over again; I doubt if I should have made so good a use of my time as mere accident has compelled me to do. Many things I could certainly mend, and spare myself both time and trouble; but, on the whole, if I had done very differently from what I have, I dare say I should have repented more than I now do of anything; and this is a tolerable retrospect of 40 years of one's life. I have learned more or less perfectly a tolerable variety of things in this world; but there are two things that I have never yet learned, and I suppose never shall—to get up and to go to bed. It is now past 12 o'clock, but I must write for an hour longer."

One of the oldest and most valued of Dr. Young's friends, Hudson Gurney, said of him: "Dr. Young's opinion was, that it was probably most advantageous to mankind that the researches of some inquirers should be concentrated within a given compass, but that others should pass more rapidly through a wider range—that the faculties of the mind were more exercised, and probably rendered

stronger, by going beyond the rudiments and overcoming the great elementary difficulties of a variety of studies than by employing the same number of hours in any one pursuit—that the doctrine of the division of labor, however applicable to material product, was not so to intellect, and that it went to reduce the dignity of man in the scale of rational existences. He thought it so impossible to foresee the capabilities of improvement in any science, so much of accident having led to the most important discoveries, that no man could say what might be the comparative advantage of any one study rather than of another; and though he would scarcely have recommended the plan of his own as the model of those of others, he still was satisfied in the course which he had pursued.

"It has been said that the powers of imagination were the only ones of which he was destitute. From the highly poetical cast of some of his early Greek translations, this is at least doubtful. It might, perhaps, have been said more justly that he never cultivated the talent of throwing a brilliancy on objects which he had not ascertained to belong to them. Dr. Young was emphatically a man of truth. The truth, the whole truth, and nothing but the truth was the end at which he aimed in all his investigations, and he could not bear, in the most common conversation, the slightest degree of exaggeration, or even of coloring. Now, all exercise of what is ordinarily called imagination is the figuring forth something which, either in kind or in degree, is not in truth existent; and whether originally gifted with this faculty or otherwise, Dr. Young would, on principle, have abstained from its indulgence.

"To sum up the whole with that which passes all acquirement, Dr. Young was a man, in all the relations of life, upright, kind-hearted, blameless. His domestic virtues were as exemplary as his talents were great. He was entirely free from either envy or jealousy, and the assistance which he gave to others engaged in the same lines of research with himself was constant and unbounded. His morality through life had been pure, though unostentatious. His religious sentiments were by himself stated to be liberal, though orthodox. He had extensively studied the Scriptures, of which the precepts were deeply impressed upon his mind from his earliest years; and he evidenced the faith which he professed in an unbending course of usefulness and rectitude."

EDITORIAL.

YANKEE VOLUNTEERS.

While we realize the likelihood of an artificial and inaccurate element in public statements about personal concerns, in letters supposedly private but really written for publication, in autobiographies, confessions, and private journals, nevertheless such speeches and writings as claim to give the hearer or reader a peep into the human heart and a view of the secret springs of action have an undying fascination. We know that our most intimate associates constantly harbor thoughts and fancies to which we shall be strangers ever. In unusual situations when there is no time to deliberate on a course of conduct we do things on the spur of the moment at which we ourselves are surprised; things which seem to prove that there are forces working within us of which we are entirely ignorant. History shows us only the externals of men and events. The motives and causes are usually matters of conjecture. Writers of fiction even when giving loose rein to their imaginations seldom dare to present human nature as it really is.

Hence anything purporting to be a human document is sure to have a multitude of eager readers. Rousseau did not need to be a philosopher and a conspicuous figure at a critical moment in the development of human thought for his "Confessions" to become popular, and the numberless individuals who reveled in the journal of Marie Bashkirtseff were little concerned with her station in life or her accomplishments in the world of art, demanding only the assurance that her pages contained the spontaneous effusions of a real and not an imaginary person. Not only is fact stranger than fiction, but it is infinitely more interesting, and if the school of "realists" had the wit to leave out the vulgar and unessential details which some unexplainable, inherent vice compels them to introduce into every novel and every picture they would have a universal following.

A medical officer from one of our most frequented recruiting offices has furnished the appended list of answers given by recruits to the question, "Why do you want to enlist?"

"I don't know." This man was probably capable of more accurate processes of thought and analysis than might appear to superficial view.

"Well, I got no idea except I don't want to be taken away. Better go before I'm sent."

"Might as well go now as to let 'em pull me in."

"Well, I wanted to get away from that draft."

"I wanted to volunteer before the draft."

"Might as well go as get drafted."

"I got to go. Got to go some time; might as well go now."

These references to the draft are significant of widespread misconceptions of a citizen's obligations.

"Well, nothing. I don't get along with my brothers good, see?"

"One thing in my life I want to do is to live down that bad-conduct discharge." ("Out, damned spot.")

"Don't want to get drafted in the Army. That's all."

"It's something everybody's got to do now, and I'd like to get into the Navy rather than the Army."

"Want to do something for my country. What's the use of staying around home and let all the other guys go?"

"Just to go in, in an ordinary way, like anybody else." (A somber modesty this; patriotism that does not demand the seal of a commission.)

"I think it's my duty."

"Got a lot of friends in already and I'm not fixed any of the best where I am." ("Behold an Israelite in whom there is no guile.")

"I want to get the experience; that's all." (Physicians please note.)

"I'm out of work and ain't got nobody here. I live in Oklahoma." (Somewhat of a humorist.)

"Just feel like going in. Want to get away from the saloon business." (Coming events cast their shadows before.)

"Being as there's war I want to fight for Uncle Sam."

"Well, just to serve my country."

"I see all the other fellows going in and I want to, too." (Man is a gregarious animal.)

"I want to fight for my country; always have, but father wouldn't let me before I was twenty-one."

"Just to be a patriot like the rest of 'em, I suppose."

"I want to be an electrician."

The following are unsolicited testimonials for the naval service:

"A fellow I roomed with in Bridgeport told me it was all right in there."

"I think it's a good place because there ain't no strikes there. I'm a plumber and want steady work."

"I think I could do better work in the Navy."

"I had an inclination to join the Navy because I've seen fellows after they had been in."

"Why, so I can learn something. I think the Navy is better that way than the Army."

"It's a good change from bookkeeping."

"To be more trained. That's all."

"Well, I belonged to the artillery. I'd rather be in the Navy. I've got a couple of friends in there and they say it's very nice in there."

"I expect to learn radio."

"To better myself."

"To make a man of myself."

"I've got a brother in it."

"A few friends of mine joined and so I want to, too."

"I can go in as a fireman and when I come out I can have a good business because they learn you in there."

The following answer frankly suggests very mixed motives:

"I like the life. I can make more money in there and learn a trade."

Equally candid is the answer: "Well I haven't got a job."

We get a flavor of the flotsam and jetsam of life in such answers as these:

"Just want to join, getting sick of everything. That's all." "I don't know. I've done quite a little bit of traveling and I'd like to do some more." "I can't do nothing at the present time and I want to go and fight." "I think I might be better off." "Because I lost my parents." "I'd sooner go in there than hang around." "I want to get away from the gang I'm hanging out with." "I was talking to a fellow yesterday and he said it was pretty good." "I think I've got to go in. My mind has been on the Navy ever since I left school." "I've been out of work three months and I'm tired of it." "Just for a pastime." "Out of work." "I just saw the signs all around and thought I'd help the country. That's all." "I was out of work first time I tried and I ain't been working since, and now they're going to draft me." "I've got no people and I thought I could get in." "Just for the excitement of it." "I have no home and no people and I want to go."

We group together the answers that intimate a higher motive and through their very simplicity and ingenuousness bear the stamp of truth:

"Just to fight." "Well, I asked my mother and she said I could." "Just to serve my country." "They need men." "Can serve my country and learn a trade at the same time." "I think it's my duty." "I want to serve my country." (The man was known to have a good job.) "Well, it seems to be the time of need." (This boy is descended from a soldier of the Revolutionary period.) "My father told me to enlist." "So I can be of use to somebody." "Why, so I can be of some service." "To do what I can. That's all. Father told me to come down and enlist." "To be patriotic and serve my

country. I'm subject to the draft and want to get into the Navy before they get me into the Army." "Just to fight for my country." "To serve the Nation." "I thought they needed me." "A lot of the fellows in my block went in." "Primarily to serve in the war. Not so much for education because I've had one year in college." "I hope to have the opportunity to redeem myself after my bad-conduct discharge." "It's hard to explain; I think it's my duty and I want to do it." "For patriotism, sir."

It would be interesting to know the name and nationality of the candidates quoted in this hasty search for the actuating influences that guided them to the recruiting office. On the Continent of Europe we have an expansive and outspoken race wholly free from that great defect of the Saxon, *mauvaise honte*. For an Italian or Frenchman to speak of his love of country is as natural as for him to kiss his whiskered chum good-by at a railway station. If we fall short of the excess of reserve that characterizes the Britisher in society and makes him dread American effusiveness, we equal him in our horror of professing fine sentiments. We prefer the cold word "duty" to the more glowing "patriotism" or "love of country," and the old spread-eagle oratory of Fourth of July celebrations is very much out of fashion. We squirm in our seats when public speakers tend to get mellow and slop over about their country. The guess may be hazarded that many of those who frankly professed themselves patriots were Latin or Kelt, and it is more than likely, too, that many a man who thought he was honest in giving, as a reason, need of employment, a desire to learn, the longing for a change of scene, was unconsciously acting from motives of a high and noble order. Our young American has the sentiment of patriotism, but is not sentimental and does not wear his heart on his sleeve. He might whistle the Marseillaise, but who can imagine him bursting into song with "My country, 'tis of thee," even in the solitude of an ambrosial forest? The curt and matter of fact phrase "do my bit" has come across the water and is an ideal mask for the most compelling of worthy motives. For many of the men enlisting to-day the war is still a remote thing, and the danger to life, the country's grave peril, is so dimly apprehended that they would feel foolish if they tried during the ordeal of the recruiting examination to lay bare the things of which they can scarcely bring themselves to speak to father or mother.

Thackeray composed one of the least meritorious of his ballads inspired by a newspaper statement that nine-tenths of the men in a certain company confessed to having enlisted for Civil War service because of a love affair *manqué*. Had he lived in our day there would have been no excuse for his "Yankee Volunteers."

THE VALUE OF THE OPPOSITION.

If Marius and Sulla, with their respective followings, could have been rival members of the same government, associated in the administration of public affairs and dividing the responsibility for them instead of alternating in the possession of supreme power, the last days of the republic would not have been marked by proscription, murder, and bloodshed, for Rome attained greatness during the centuries marked by the constant civic contentions between plebeians and patricians, and declined during the period in which centralized power was increasingly yielded by a subservient senate and people to emperors styled "divine."

England, without a written constitution, has given to the world both the idea and the concrete example of constitutional government, a government evolved out of the long struggles between kings and barons, Lords and Commons, Whigs and Tories, Liberals and Conservatives, at the cost of but a single monarch's head. That people is indeed to be pitied whose government has not its rival parties and factions. Annoying and hampering though a powerful minority may be when some definite legislation is urgently needed, and almost universally desired, still a critical, obstructing, recalcitrant minority is the indispensable, automatic safety device of popular government.

An occasional schism in the church has compensating advantages. Heresy makes orthodoxy thoughtful as well as devout and honest; humble, intelligent doubt purifies and spiritualizes faith.

In medicine rival schools and doctrines are essential to progress, and even the charlatan and quack may possess nuggets of truth which the legitimate practitioner should not disdain to utilize if they will work ultimate good to his patients. Old crones, monthly nurses, housewives, if intelligent enough to be accurate observers of natural phenomena, often make suggestions which merit at least the consideration of the physician. J. Marion Sims learned this in the early days of his practice, when an old colored mammy proved herself superior to him in a matter of prognosis.

A mind open to conviction, the capacity to grasp what Herbert Spencer calls "the soul of truth in things erroneous," the docile spirit willing to be taught by simpleton, child, and dotard, if they have something valuable to impart—these are the attributes of the scientific man, and to be able to learn from rivals and enemies is not greatness, but merely a proof of not being small.

When Samuel Christian Friedrich Hahneman at the beginning of the last century formulated a system of medicine based on experiments on his own person and on some of the doctrines of that original thinker, popular idol, most lovable vagabond and archquack,

Paracelsus, he gave nothing of direct value to the world, because his treatment was directed essentially to the symptoms and not to the causes of disease. Indirectly, however, he conferred a benefit upon humanity by creating a conservative school of dosing, compelling the favorers of copious draughts and drenches to look to their laurels and reform their methods. The increasingly simple therapy of our day is not derived from homeopathy, but undoubtedly the practical success of many of the followers of Hahneman, who himself died a millionaire, has emphasized the reliance which must be placed on nursing, food, and general regimen, since we reject the efficacy of infinitesimal dilutions, essentially different from preferring a minute dose of alkaloid to the pint of decoction of the bark.

The man or woman, well provided with this world's goods, who had no serious bodily ailment and yet was made miserable by constantly focusing the mind on self and magnifying every trifling physical discomfort, who had perhaps acquired the vicious habit of taking medicine for anything and everything, was sure to be highly insulted if the doctor declined to write a prescription and advised golf and settlement work instead. Christian Science, so called, has reclaimed many of these unfortunates and emphasized for the physician the important fact that imponderable remedies are often superior to herb and mineral. It has popularized the fact that a little self-control and the cultivation of a Spartan spirit is, in the long run, better than a constant resort to aspirin and its congeners. If a certain number of the devotees of the new cult succumb annually to untreated appendicitis, their loss is counterbalanced by the tonic effect which such instances produce on the general public, characterized in the main by a good deal of horse sense. The conscientious physician, free from a blind faith in a multiplicity of drugs and only too glad to practice preventive medicine, finds it increasingly easy to say: "Madam, the tonic you need is oxygen and exercise," or "Stop the candy and save on cathartics." The public, ever ready to pronounce a doctor indifferent and unsatisfactory, is becoming accustomed to the idea that he can earn his fee by good advice as well as by written prescriptions. As the homeopath encouraged the small dose, so the Christian Scientist tends to promote a drugless therapy and preventive medicine.

We owe to the chiropractors and osteopaths a fresh and striking example of the cardinal error, common to all ages, of trying to make a panacea out of a measure of great usefulness in a limited field. They should constantly remind us of the danger of riding a willing horse to death. Every advance in medicine, every discovery, every diagnostic device, every scheme of treatment, which has a promise of usefulness when thoroughly understood and used with discrimination, finds at once its overenthusiastic champion ready to discard conservative practices, sanctioned by reasonable success, in favor of

a new method giving more promise than assurance of solving long-studied problems. Tuberculin, X-ray, salvarsan, radium, the Wassermann test, even quarantine and disinfection, all suggest themselves at once as examples of measures of great value, which at one time or another have been employed with as little judgment as the advocate of local treatment displays when he proposes to cure lumbago, a dislocated vertebra, and a duodenal ulcer by one and the same method. It is not so many years since the germ theory of disease so possessed our minds that we not only neglected but scornfully discredited the factors contributory to germ activity in a violent reaction from the teachings of previous generations in which too much was ascribed to mere circulatory disturbances.

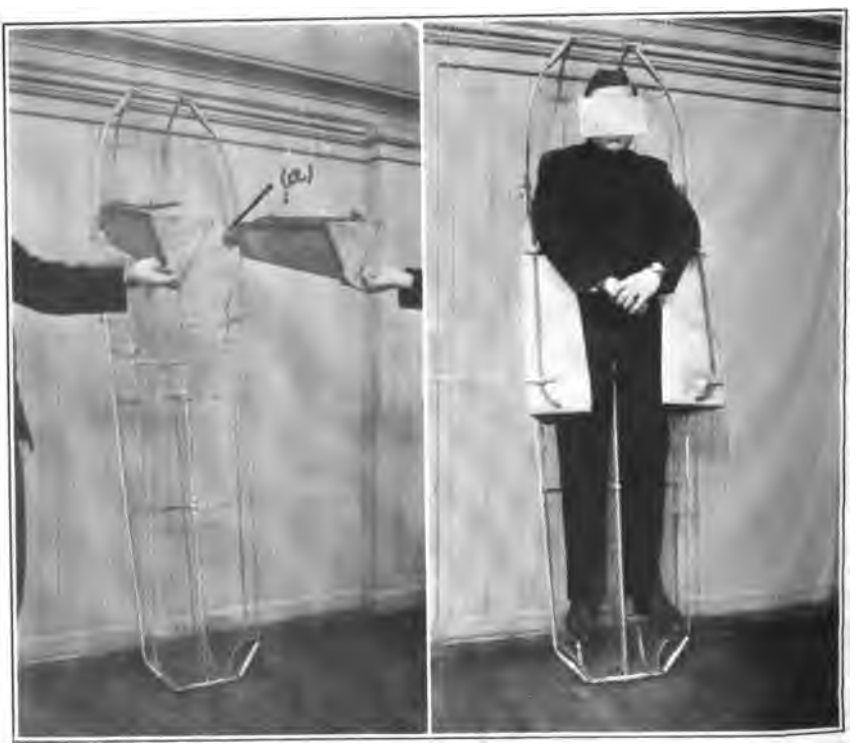
The ignorant, specious opponent of vaccination is responsible for many a death from smallpox, but he has undoubtedly done much good by compelling us to be more careful. The deaths from tetanus following vaccination are all ascribed by him to vaccination on the *post hoc ergo propter hoc* principle, whose acceptance, alas, is not confined wholly to the man in the street. The menace of tuberculosis and syphilis is faced every day in a thousand unperceived, unappreciated ways and with a fool's temerity where the risk is evident by many a man who is loud in his denunciations of serums and vaccines. But, as we dispassionately survey the progress of medicine, justice compels us to recognize our obligations even to these misguided advocates. It is in part due to their attacks that vaccine is now manufactured from cattle not susceptible to syphilis, from cattle carefully tested for tuberculosis; that it is manufactured under Government supervision; that animal inoculations rule out the danger of tetanus; that we are increasingly careful to perform the little operation of vaccinating with scrupulous attention to cleanliness.

Not only then are we to refrain from bitterness or hostility toward those who seem to hamper our honest efforts to improve the condition of our fellow men along the lines indicated by well demonstrated facts, but we must force ourselves to recognize without partiality or prejudice that even the most unenlightened opposition has an essential place in the scheme of human development. The ever-present danger for those who have a great deal of right on their side is the assumption that they are wholly right. The preponderance of injustice in criticism must not blind us to our own liability to error. If we are honest, we are bound to see in the rise of many schools of special treatment a proof that scientific medicine is prone to neglect useful though minor adjuvants to recovery.

It remains to be said that a spirit of fairness and justice is not incompatible with devotion to principle. We must not confound broadmindedness with supine indifference to noxious activities, nor permit our laziness or timidity to masquerade as tolerance.

Fig. 1.—Kopak jacket. Useless.

Fig. 2.—Air chamber. Successful.



Figs. 3 and 4.—Stokes's stretcher fitted with air chambers.

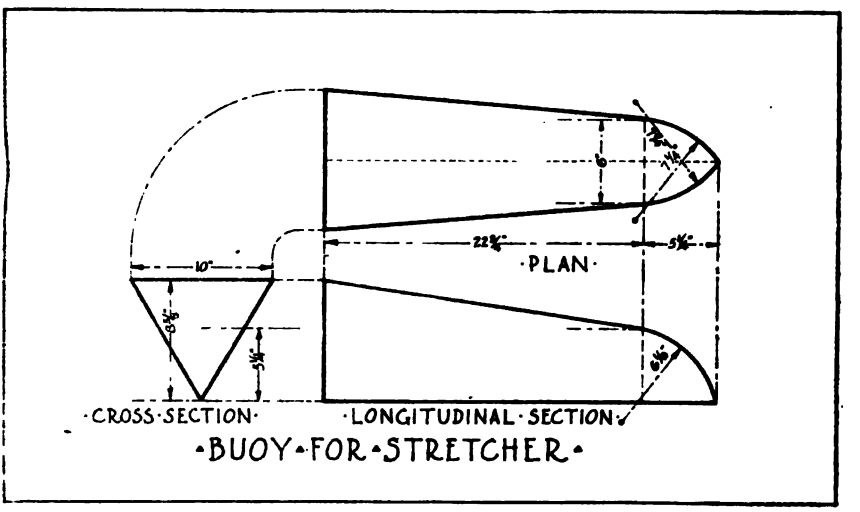
SUGGESTED DEVICES.

AIR CHAMBERS FOR THE NAVY STRETCHER.

By J. A. B. SINCLAIR, Acting Assistant Surgeon, United States Navy.

On January 12, 1918, in Puget Sound, with one kopak jacket on the "patient" in regular way, another inside of the stretcher in the same position as the first (but with arms not passed through armholes), and a third around outside of stretcher, the tout ensemble was dropped over the side.

The jackets did not adequately suspend the patient contained in the Stokes stretcher, nor did the two assume a correct or comfortable



position, as the feet tended to back away and the face to dip forward into the water, requiring the patient to take his head out of the usual position in the stretcher and elevate it as high as possible to prevent an "eyefull." For the purpose in view it was clear that kopak jackets were useless. (Fig. 1.)

On February 1, at the same place, having had the ship's carpenter make two galvanized-iron air chambers, as shown in the accompanying illustrations and drawing, an overboard experiment was made. The result is shown in figure 2. There was no "dipping," the position was upright and vertical, and the sense of security striking, while the use of the arms was not impeded.

Conclusion: Air-chamber attachments to the Stokes stretcher are practicable and cheap, being made from scrap galvanized iron by the ship's carpenter. Similar chambers of sheet tin may be made at even less expense.

The average weight of six stretchers supplied to this ship is 26.75 pounds. Weight of stretcher (experimentation), 25.50 pounds. Length of tanks, 27 inches (mean). Capacity of tanks, 860 cubic inches each. Capacity of both tanks, 1,720 cubic inches, approximately 1 cubic foot. Distance of tank hinge or fulcrum (*a*) from extreme forward end or head of stretcher, 24 inches. Total buoyancy of two tanks in salt water, 64 pounds. Weight of stretcher used, 25.50 pounds. Weight of two tanks or chambers with iron rod arms, 14.50 pounds. Weight of stretcher with tanks, 40 pounds.

Buoyancy required to sustain average patient, in salt water, 20 pounds. Tanks are readily detachable from stretcher.

PREPARATION OF IDENTIFICATION TAGS.

By M. A. STUART, Surgeon, United States Navy.

In making approximately 500 identification tags for the officers and crew of the vessel it has been found that the following minor details have aided greatly in the making of uniformly good tags.

Cleaning the tags thoroughly on both sides with a piece of cloth or gauze moistened with turpentine gives more distinct finger prints that etch without blurring. In using uncleaned tags, there is a tendency for the powdered asphaltum to stick over the surface of the tag, interfering with the action of the acid and giving tags that are not cut clearly. After heating, the tag should be as bright where it is not inked as before the heating.

In our experience the turpentine substitute issued to the Navy, called turpinet, will not give good results when used to dilute the printer's ink either for use in making finger prints or with a steel pen. There is a tendency for the turpinet to spread on the metal beyond the ink, forming a moist zone around the markings or between the lines of the finger prints to which the powdered asphaltum will adhere preventing the action of the acid and giving blurred finger prints and markings in the finished tag.

In the etching process, we have attached each tag to a piece of ordinary Medical Department string with a single tie and suspended them in the ordinary wide-mouth bottles of about 700–800 mil capacity, such as sodium bicarbonate or boric acid is issued in, so they are just clear of the bottom, securing the strings on the side of the bottle, one by one, as the tags are placed, with a piece of adhesive plaster. The advantages of this method are economy of acid, ease of handling, absence of air bubbles on the surface of the tags (bubbles

are removed mechanically as formed by bubbles below), no slopping of acid from trays in a ship under way, no corrosion of metal containers, solution and tags can be gently agitated without difficulty, and each tag is suspended in the acid solution, allowing free and equal action of the acid on both sides at the same time.

In using a bottle of the size mentioned above, 30 tags can be easily etched at the same time, using about 180 mils of the acid mixture or 60 mils of nitric acid. It has been found that when the tags are fully etched the acid mixture, which will have a dirty turbid green appearance, should be thrown away, as the salts formed during the reaction interfere with the etching of another batch. Should the action of the acid stop before etching is complete a few mils of HCl will continue the process.

In making large numbers of tags a little teamwork can be developed that will speed up production, as one man can make finger prints, dust on the powdered asphaltum, send the tag along with a slip of paper giving necessary data to another man, who enters the data on the reverse of the tag, dusts with the powder, and heats. After heating the tags can be etched at once or placed in a box in layers between paper and etched successfully at a later date.

A SUGGESTION FOR A NEW HOSPITAL CORPS POUCH.

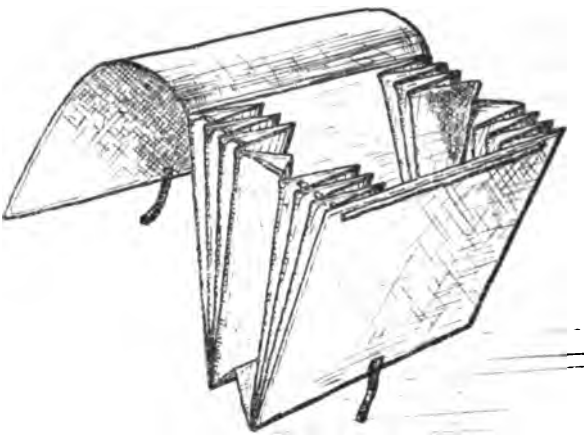
By W. E. Eaton, Passed Assistant Surgeon, United States Navy.

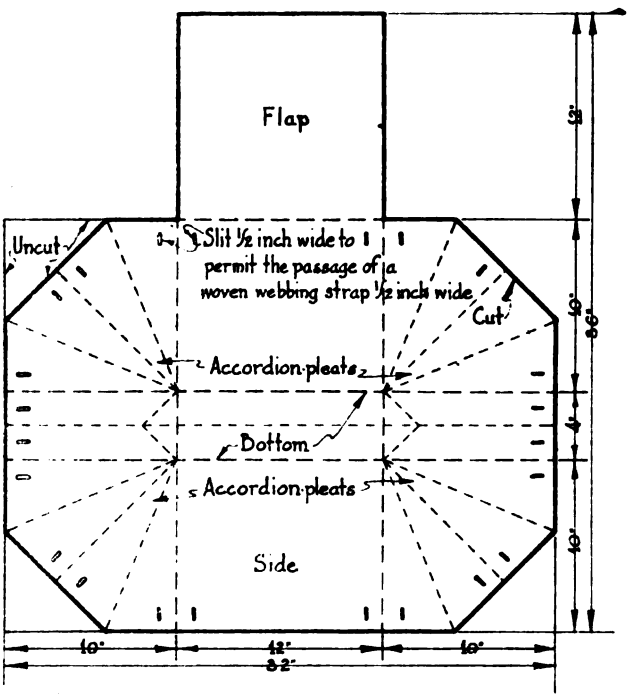
Compiaint with regard to certain faults in the Hospital Corps pouch, large and small, and its unsatisfactoriness on expeditionary service suggested to the writer that a new and more useful pattern might be devised.

The following were some of the undesirable features of the old pouch:

It permitted articles to fall out because of the manner of closing the pouch. Extra articles could not be carried, as no expansion was possible without the liability of contents spilling out, and because of faulty securing facilities. It was very difficult to get articles out of the pouch, owing to its deep, narrow, box-like construction, and it was practically necessary to empty the pouch to find something on the bottom. The entire contents of the pouch could not be exposed to full view.

The pouch described below seems to obviate all the undesirable features of the older model and has received the favorable comment and indorsement of medical officers and hospital corpsmen who have been or are now on expeditionary duty. It is constructed on the general idea of a bag with a purse string. The pouch is closed by a draw strap which also serves as the means of carrying it, and therefore the heavier the load the more securely is the opening of the




Flap
Uncut
Slit ½ inch wide to permit the passage of a woven webbing strap ½ inch wide
Cut
Accordion pleats
Bottom
Accordion pleats
Side
12"
10"
8.6"
4"
10"
10"
12"
10"
32"

·PLAN·

pouch held. A flap with securing tapes adds to this security. It is possible by this arrangement to open the pouch flat upon the ground or table and completely expose all contents to view, and subsequently by pulling upon the draw straps the contents are gathered together within and the pouch closed with expedition. The draw strap is so placed as to produce two long flat sides, upon which may be placed pockets for the equipment of the pouch, and the ends gathered in an accordion-pleat arrangement.

The description follows, from which it may be easily constructed on board ship or by the expeditionary force.

SPECIFICATIONS.

For a new "catch-all" type of Hospital Corps first-aid pouch to be slung from the shoulder or otherwise by a strap which also acts as the draw string.

The pouch consists of a rectangular body or bag 12 inches long by 10 inches deep, with a bottom 4 inches wide, and accordion pleated ends, to be covered by a flap attached to one side, all to be closed and held secure by a draw strap passing through suitably located slits, the strap also to act as a means of carrying either from the shoulder, belt, or saddle, etc., the strap to be one-half inch wide of woven webbing and equipped with a sliding wider portion as a rest when over the shoulder.

The material forming the pouch may be cut from one piece of goods, which should be of strong, serviceable texture and olive-drab or khaki color.

The pattern should be designed in such a way that the greatest length, including the portion forming the flap shall be 36 inches, the greatest width 32 inches and the portion forming the flap 12 inches square placed centrally on one side. The greater portion of the pattern therefore will be 32 by 24 inches, and as an extension of the latter dimension, there will be a flap 12 inches square.

The body or bag portion shall be folded across the greatest length in such a way that there will be two portions 10 inches wide (to form the sides) separated by a portion 4 inches wide (to form the bottom). The piece is now opened out flat and then folded across the folds just made (above) in such a way that there shall be a central portion 12 inches wide (and continuous with the flap) separating two portions each 10 inches wide. These two latter 10-inch-wide portions will now be seen to consist of two areas, each 10 inches square separated by an area 4 inches by 10 inches.

The 10-inch square areas are now folded diagonally into four equal parts, and the 4-inch area is folded longitudinally in two equal parts. All folds just made will now be arranged in such a way that accordion pleats are formed and the ends of the pouch brought into position, causing the sides to oppose each other.

We now have a pouch with sides 12 by 10 inches, a bottom 12 by 4 inches, and accordion-pleated ends. The points of two pleats at either end project beyond the top (opening) edges of the pouch when completed. These protruding points should now be cut off even with the top (opening) edges. The flap may now be folded over the opening, and by collapsing the pleated ends and folding the bottom longitudinally at its center a flat folded article is obtained.

At a point about one-half to three-fourths inches below the top (opening) edges and about 1 by 1¼ inches in from the ends (at a point which makes it possible to pass through all pleats) a perpendicular slit shall be made through all layers of the goods sufficiently large to permit of the easy passage of a woven webbing strap one-half inch wide, the edges of the slit to be worked around with a buttonhole stitch.

The strap shall be made of woven webbing one-half inch wide and sufficiently strong, heavy, and serviceable. The strap shall pass through the slits above mentioned and be just long enough to permit of the pouch being opened flat upon the

ground or table and to permit of suspending the pouch over the shoulder for transportation purposes. The strap when pulled through the slit shall securely close the opening and withhold all contents from spilling out under all circumstances. When properly adjusted contents can not shake or fall from the pouch and the pouch may be readily and quickly closed by simply pulling upon the strap allowing the pouch to assist by its weight and contents.

A sliding portion of webbing about 1½ inches wide and about 6 to 8 inches long, having a slit at either end for the passage of the strap, shall be fitted to the strap as a rest upon the shoulder when the pouch is thus suspended.

The flap shall be secured by a piece of tape sewed mesially at its lower edge and also that of the bottom of the bag.

All edges of the goods shall be taped around with tape of light weight about one-half inch wide.

A stiffening strip of thin metal, preferably steel, about one-half inch wide and long enough to extend between the slits, through which passes the draw strap, should be placed just below the top edge and on the inside surface of the front and back sides. The metal strip should be covered over and held in position by a narrow tough piece of tape sufficient in size for the purpose.

Pockets for the retention of the various articles to be placed in the pouch should be securely stitched to the front and back sides.

CLINICAL NOTES.

TABULATION OF PNEUMONIA SYMPTOMS.

By R. W. Holbrook, Passed Assistant Surgeon, United States Naval Reserve Force.

Reports coming from various Army and Navy camps coincide somewhat with the experience at the United States Naval Hospital, Great Lakes, Ill., in that the pneumonia peak was reached in the period of February 15 to March 15, both in number of cases and virulence of organisms. The following classification of symptoms is of interest in that the cases come from widely separated regiments:

History of irritated throats previous to admission	40
Chill	40
Acute localized pain in chest	38
Known temperature before admission	34
Headache	22
Vomiting	16
Pain referred to abdomen	9
Meningeal irritation	8
Albumen present	7
Rusty sputum 1st day after chill	4
Rusty sputum 2nd day after chill	26
Rusty sputum 3rd or more days after chill	13
Localization of consolidation:	
Right lower lobe	21
Left lower lobe	14
Entire left	1
Double	7
Hemolytic streptococcus (blood cultures)	14
Empyema	14
Drainage and subsequent involvement of opposite side	4

A CASE OF ACUTE ANAPHYLAXIS.

By C. W. Carr, Passed Assistant Surgeon, United States Navy.

E. S. H. was admitted to the United States Naval Hospital, Great Lakes, Ill., at 10.30 p. m., December 23, 1917, with a history of a sore throat for the previous 12 hours and of being weak and shaky since 8 o'clock. Examination showed a slight, grayish membrane over the upper part of the posterior pharyngeal wall.

At 11 p. m. his temperature was 103 F., pulse 120 and respiration 24 and the membrane had spread over both tonsils. A smear and culture were taken of the membrane, both of which later proved positive to diphtheria. E. S. H. denied having had any serum treatment given to him in any sickness before or ever having any respiratory trouble when he was around horses.

At 12.45 a. m. 10,000 units of diphtheria antitoxin was given. In five minutes symptons of respiratory distress began to develop and patient became very restless and apprehensive. The respiratory symptoms became progressively worse and patient more and more cyanotic until voluntary respiration ceased at 12.55 a. m. 10 minutes after the antitoxin was administered. Artificial respiration, oxygen and stimulants had not the slightest effect. The heart beat weakened and finally stopped at 1.10 a. m.

In order to verify E. S. H.'s statement his mother was written to and asked if her son was ever subject to hay fever or asthma or had any trouble when around horses. She replied that her son had no trouble when around horses but that since he was a child cats caused attacks of sneezing whenever they came in his vicinity. He also was troubled with hay fever every fall until last fall, when he was on the Lakes and escaped his usual autumn attack.

A DEATH FROM SALVARSAN.

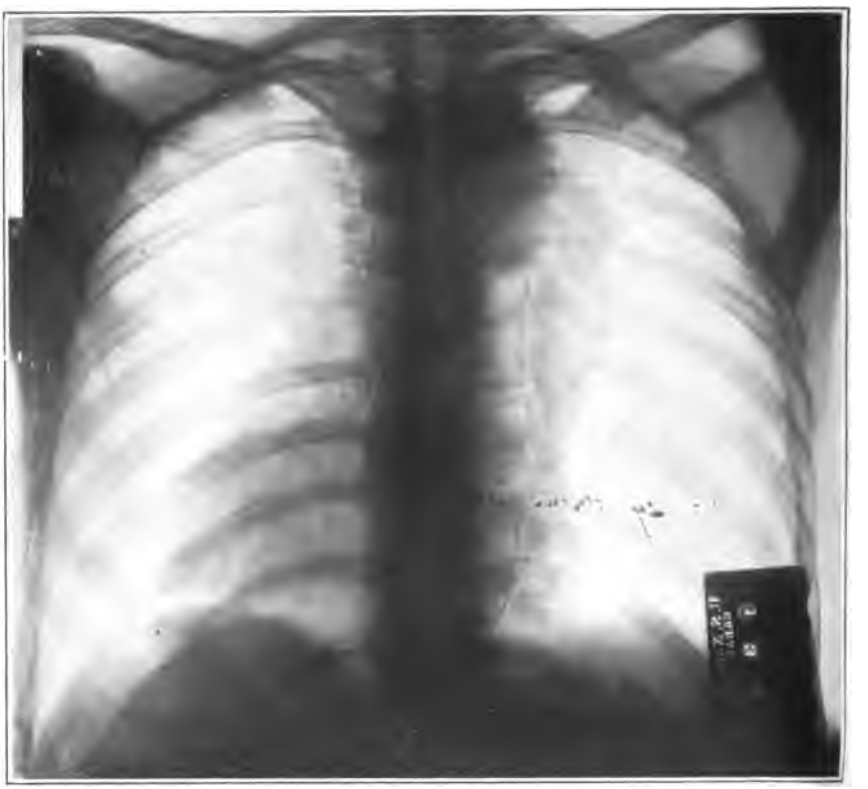
By F. B. McNIERNEY, Assistant Surgeon, United States Naval Reserve Force.

When this patient was admitted he had a typical chancre on penis with characteristic syphiloderm and general adenopathy following. Wassermann tests were taken, one weak positive February 11, another positive 4 plus February 14. He received in all four injections of salvarsan 0.6 grams of the new product manufactured in the United States of America under German formula.

The first two injections were without any marked reaction while he had a little vomiting following the third administration. After the fourth dose he had hardly any discomfort and was about the ward in 10 minutes.

Four days after this final dose of salvarsan the patient complained of severe abdominal cramps and vomited frequently during the day. A diarrhea set in lasting several days and the vomiting persisted until the end. This was projectile in type with no nausea. The vomitus finally consisted of thin fluid and some mucus, all bile tinged.

He had abdominal tenderness which passed away and there was distension of the bladder due probably to lack of nervous stimulation to bring on act of urination. Catheterization was continued until the end. Urine after several examinations showed nothing of importance except late in his illness when a trace of albumen was discovered.



Abscess of mediastinum before rupture.

Examinations of blood and cultures of the same gave no special evidence for diagnosis.

His continuous vomiting acted like an arsenic poisoning and when he began to develop languor with signs of nerve degeneration, probably central, we were more convinced of his condition. First his reflexes became slow, the knee jerks responded weakly and ankle clonus was not a normal result. Pupils were sluggish in their response to light. Although equal, they were only partially dilated most of the time. His temperature was never elevated and descended to subnormal due to exhaustion, while his pulse rate was about 90, moderately full, and keeping fairly strong to the end.

A chest condition presented itself about the third day of his illness which resulted finally in hypostatic congestion of the lungs and a bronchitis giving him much trouble due to mucus in the throat which caused him in his weakened condition to gag frequently in attempts to remove the material.

His marked lassitude and poor response to stimulus gave way to a paralysis of both limbs and almost lack of skin sensitivity. Bladder as stated could not be voluntarily emptied and there were involuntary bowel passages. He responded when spoken to very slowly and could hardly use arms unless helped.

The final picture was complete loss of consciousness and general helplessness ending an illness of six days.

This condition appears to be an acute poisoning from this new salvarsan, which acted as an arsenic destruction of brain and nerve tissues. The vomiting was no doubt central as no other cause could be determined for that symptom and the diarrhea.

A CASE OF ABSCESS OF MEDIASTINUM.

By A. G. SUND, Assistant Surgeon, United States Naval Reserve Force.

W. G. S. was admitted to the United States Naval Hospital, Great Lakes, Ill., February 11, with an undetermined diagnosis from the sick bay of his regiment. He had complained for a week previously of a severe sore throat, anorexia, dysphagia, and weakness. On admission his oral pharynx showed only a very slight general injection; there was no tonsillar involvement. His daily temperature ranged from normal in the morning to 103 F. in the afternoon. He carried his head well forward, saying that bending his head backward seemed to stretch something in his upper chest and cause him pain. His most comfortable posture was in bed, lying on his left side, with his head brought well forward.

Examination showed him to be rather emaciated, anemic, and to have a septic look. The head showed nothing. The neck was stiff, as described above; the cervical glands showed slight enlargement and tenderness. There was no trachael tug. The lungs were nega-

tive. The heart dullness extended on the left to the nipple line in the fifth interspace; auscultation was negative. The supracardiac dullness was definitely increased, measuring 9 cm. in the second interspace—5 cm. to the left and 4 to the right. Posteriorly an area of dullness was found in the right interscapular space, at the level of the fourth, fifth, and sixth dorsal spines. Nothing could be found by auscultation. The two radial pulses were equal and synchronous. The abdomen and extremities were negative. There was no general adenopathy.

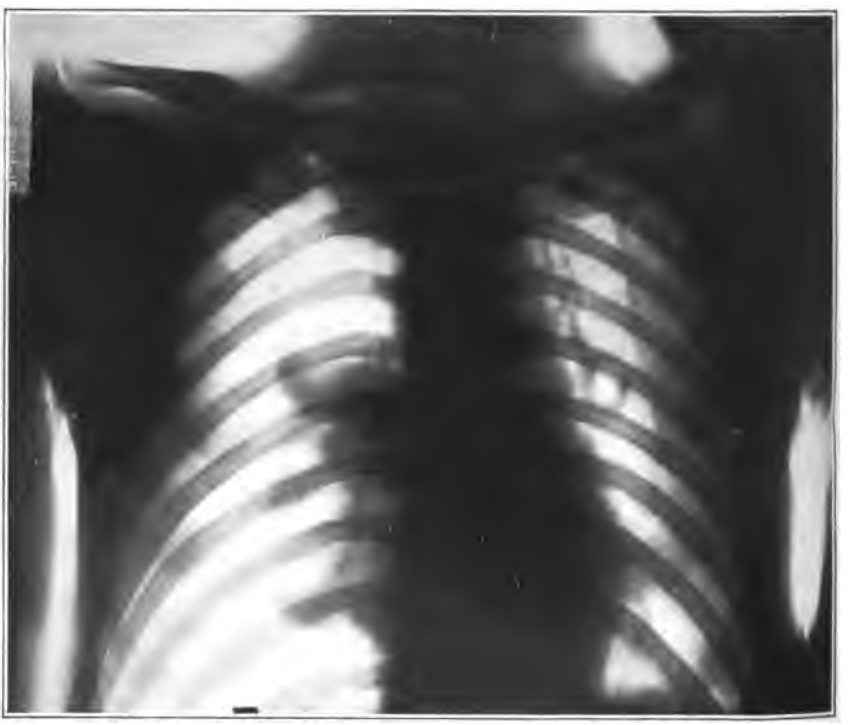
The blood showed 4,232,000 red cells, hemoglobin 90, and 18,300 leucocytes, with 87 per cent polymorphonuclears. The urine was negative. The sputum showed no tubercle bacilli. The Wassermann was negative twice. Blood pressure, 125–180.

The stereoscopic examination showed a mass the size of an orange in the right superior mediastinum on a plane posterior to the heart. It did not pulsate and did not move, but seemed to displace the great vessels slightly toward the left. A barium suspension passed the tumor without showing any constriction or deviation of the esophagus, although the patient complained of pain as it passed by. The lung fields and hiluses were normal.

The diagnosis then rested between lymphadenitis and abscess of the mediastinum. The patient was put to bed, given a liquid diet and potassium iodide in doses of xx minims of the saturated solution t. i. d., and deep pharyngeal swabs of silvol. This condition remained unchanged for two weeks, except that a constant dull pain, referred to the area of the manubrium developed and the leucocyte count rose to 28,500, with 85 per cent P. M. N. Codeine had to be given a few nights to give relief from the pain. Heat locally also seemed grateful to the patient.

In the evening of March 4, without any apparent immediate cause, and not preceded by any special symptoms, the patient suddenly gagged, and brought up through the esophagus about a pint of fairly thick, white pus, streaked with blood. The patient immediately felt relieved from the constant dragging pain in his chest, and the temperature dropped to 97°. Examination of the pus showed a preponderance of the pus cocci, but cultural studies were impossible because of contamination from the mouth and the receptacle. No tubercle bacilli or débris suggestive of a cold abscess were found. The abscess discharged slightly for two days, at the end of which time an Einhorn tube was passed into his stomach for feeding. The tube was retained in place for a week, when the temperature began to rise gradually to 101 F. The tube was removed and the temperature became again normal, and has remained normal since. An X-ray one week after the rupture showed the mass gone. There was no evidence of pathology of the esophagus. At this date—three

Abscess of mediastinum after rupture.



Spontaneous pneumothorax showing collapsed left lung.

weeks after rupture—the patient is up and about, there is no complaint, no symptoms, and the leucocyte count is down to 12,000, and he takes solid food without discomfort.

A CASE OF SPONTANEOUS PNEUMOTHORAX.

By A. G. SUND, Assistant Surgeon, United States Naval Reserve Force.

E. M. D. was admitted February 14, 1918. He had been taking a shower bath and changed quickly from hot to cold water. This caused a sudden gasp, following which he felt a severe, sharp pain in the upper left chest, and became markedly dyspneic. He sat down on a chair for a while and was then able to dress and walk over to sick bay, from which he was sent to the hospital.

Examination showed a well developed, well nourished man of good color, complaining of dyspnea and a dry irritating cough when lying on his left side. The chest was well formed, both sides expanded equally on respiration. The right chest was negative throughout. The left chest showed absence of vocal fremitus, and a hyperresonant percussion note extending down to the lower costal margin. The cardiac dullness was displaced downward and to the right, the maximum impulse being in the epigastrium. Auscultation of the heart gave distant sounds at the apex, the second pulmonic sound was accentuated. Auscultation of the left chest gave absence of the breath sounds, very faint voice sounds, and absence of whispered voice sounds. No succussion sounds were present, and the coin-test could not be elicited.

Fluoroscopic examination showed the dense shadow of the left lung at the hilus. There was no sign of fluid or of pathology in the right lung. (See illustration.)

There was no family history of tuberculosis and the patient had never had a chronic cough. The respirations the first week averaged 20, the pulse 88, and the temperature varied between 98° and 98.6 F. The blood and urine examinations were negative. Only two specimens of sputum were obtained and they were negative for bacillus tuberculosis. Diagnosis: Closed, spontaneous pneumothorax.

March 1 breath sounds and very dry crackles were heard over the left chest anteriorly. No adventitious sounds were heard over the right lung. The patient was allowed to be up, but the amount of exercise restricted.

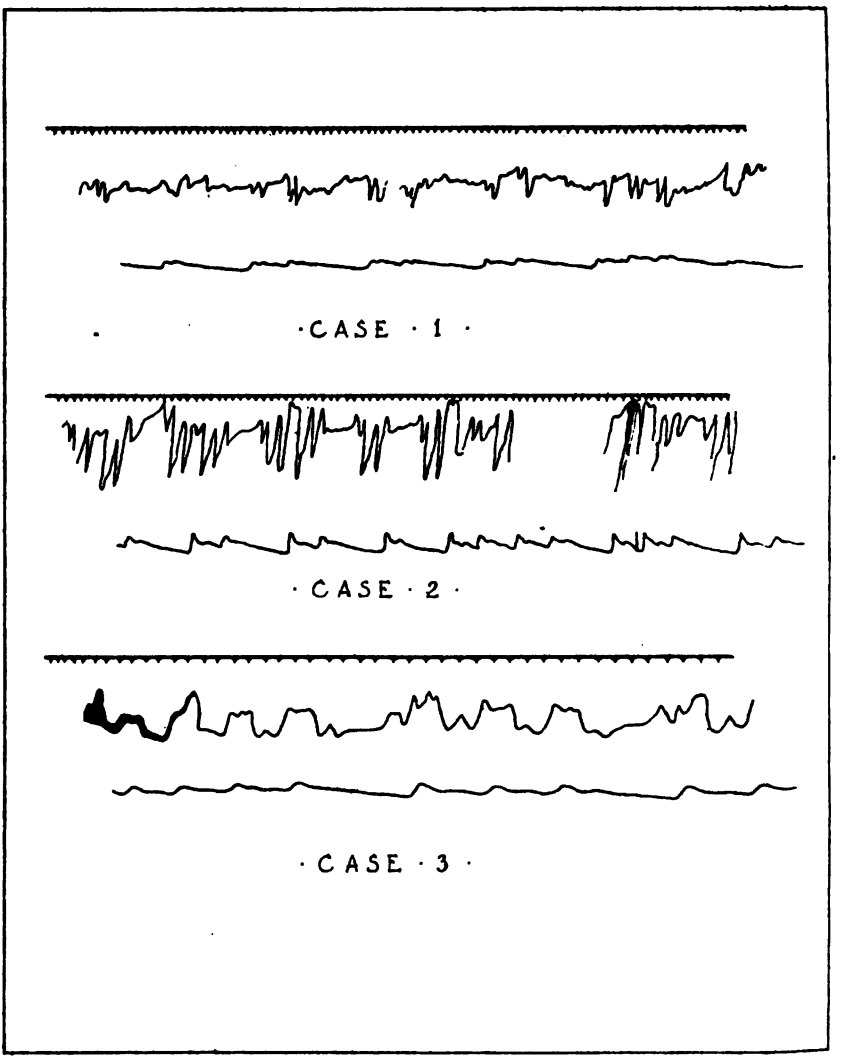
The dyspnea became less marked from day to day, and the breath sounds became audible farther down. March 15 the physical findings were the same on both sides of the chest, and the X-ray showed the left lung completely expanded. (See illustration.) At the present time there is no complaint, and the pulse, temperature, and respirations are normal.

58725—18——8

HEART BLOCK AND DROPPED BEATS. REPORT OF THREE CASES.

By N. H. CLARK, Surgeon, United States Naval Reserve Force.

These cases were studied at the United States Naval Hospital, Great Lakes, Ill.



Heart Block and Dropped Beats.

Case No. 1. R. B., admitted with diphtheria. Severe case. Antitoxin administered intravenously. Local symptoms disappeared. Myocarditis. Heart block. Patient died. Pulse rate before death, 30.

Case No. 2. G. B., admitted with otitis media, acute. Developed acute rheumatic fever with acute endocarditis. January 31, 1918, dropped beats. Normal rhythm after February 16, 1918, until medical discharge.

Fully expanded lung after pneumothorax.

Case No. 3. C. P., admitted to hospital March 18, 1918, with lobar pneumonia, endocarditis, dilatation of right heart, dropped beats, pulse rate 56.

The above records were made with the Mackenzie polygraph. The upper tracing is from the jugular, the lower from the radial pulse; (*a*)=the auricular beat. Each *a* should be followed by a pulse wave Where this fails, the impulse or stimulus, has been blocked.

STREPTOCOCCAL EMPYEMA.

By A. E. YOUNIE, Passed Assistant Surgeon, United States Navy.

During the past year a large number of cases of empyema have developed in the United States Naval Hospital, Great Lakes, Ill., following measles, broncho-pneumonia, lobar pneumonia, and occasionally scarlet fever. These cases have all been characterized by an insidious onset, extreme toxicity, and the presence of a hemolytic streptococcus in the pleural exudate.

The first indication of this extremely grave complication is, in the majority of cases, the characteristic temperature curve from subnormal to 101° in the morning with an afternoon and evening rise to 102° or 104°. This is generally accompanied by a gradual rise in pulse and respiratory rate with light delirium at night. Careful physical examination at this time may show no signs of fluid in the chest. Later of course, the characteristic dullness or flatness (which may or may not change with posture), decreased breath sounds, and diminished vocal and tactile fremitus appear.

As the patient's chances for recovery depend largely upon the prompt recognition of the condition with immediate drainage, the necessity for routine examination for signs of fluid, with prompt exploratory puncture of all suspicious cases, is obvious. Fluoroscopy is an invaluable aid in making an early diagnosis.

The prognosis in cases drained early is fairly good, providing the primary disease has not made too great an inroad upon the patient's vitality. In a certain percentage of cases, however, notwithstanding early and thorough drainage, death occurs from profound toxemia, pericarditis, myocarditis, mediastinitis, or general peritonitis. The pericarditis, myocarditis, and mediastinitis are probably due to a direct extension of the infection, being more common in left-sided empyema. The peritonitis would seem to be hematogenous in origin, there being no special involvement of the diaphragmatic peritoneum, while blood cultures are uniformly positive.

All cases with peritoneal involvement have been fatal, death occurring in from 12 to 36 hours. Peritoneal drainage has had no effect in either hastening or prolonging the end. The following case report is of interest in showing the profound systemic toxemia pro-

duced by the hemolytic streptococcus, death occurring from uncontrollable hemorrhage.

Y. J. F., admitted to hospital January 25, 1918, with diagnosis of pleurisy serofibrinous, left. Pulse 120, temperature 102°, respiration 44. Diagnosis changed to pleurisy suppurative January 26, 1918. Eighth rib posterior axillary line resected under local anesthesia, 800 c. c. thin lemon-tinted fluid containing numerous pus cells and streptococci evacuated. Continuous irrigation with 1-1000 hypochlorite solution for 48 hours when return fluid became clear.

February 1, 1918: Pulse 96, temperature 98.6°, respiration 25, less septic, condition apparently favorable. During the entire month of February drained freely, but irregular afternoon fever persisted. March 1, chill with fever 104°, developed nausea, distension, and light delirium. March 2, temperature normal, distension relieved, comfortable. March 9, nausea, regurgitated without warning or apparent effort over 500 c. c. fresh blood. March 10, second gastric hemorrhage, died.

Autopsy findings: Left pleural space almost obliterated, lung being very well expanded, plastic pericarditis and mediastinitis with a small pocket of pus in mediastinum. Oesophagus normal, stomach and duodenum almost completely filled with fresh blood clot, mucous membrane of stomach and duodenum congested with no gross lesions. Apparently the severe hemorrhage was due to an endothelial-lysis of capillaries similar to that occuring in yellow fever.

The treatment in all cases of empyema from whatever cause is, of course, immediate drainage, best accomplished by rib resection under local anesthesia. The operation is absolutely painless and produces little or no shock, the patient leaving the operating room in better condition than when he entered, in the great majority of cases. The point selected for drainage depends upon the location of the fluid, but generally the seventh rib in the mid-axillary line or the eighth rib in the posterior axillary line is chosen. If the posterior axillary line is selected, the incision should be made at right angles to the rib in the direction of the fibers of the Latissimus dorsi, as recommended by Binney. The muscle fibers are separated, the wound retracted, and from 1 inch to 1½ inches of rib resected in the usual manner. After placing silkworm gut sutures for closure of muscle and skin, the pleura is opened very carefully to avoid injury to adherent lung or diaphragm and the pus evacuated slowly. After exploring with the finger for pus pockets, etc., drainage tubes are inserted, stitched into place, and the sutures previously introduced tied.

Our first series of cases was treated by simple drainage, the mortality being very high, but during the past 10 months all cases of streptococcic empyema have been placed on continuous irrigation immediately after operation, a 1–1,000 hypochlorite solution giving the best results. This is carried out by introducing two fenestrated rubber tubes and stitching in place. One tube is connected up with a reservoir and the solution allowed to run in at the rate of 20 to 30 drops per minute. The other tube is connected to a long tube which drains into a bottle beneath the bed. This arrangement favors lung expansion, as the tubes are surrounded by gauze covered with vase-

line, and there is practically no leakage of air through the wound. The solution in the reservoir is kept at a temperature sufficiently high so that the solution enters the pleural cavity at body temperature.

In from 24 to 72 hours the return drainage, which at first contained large quantities of pus and fibrin, becomes clear, when continuous irrigation may be replaced by simple drainage with daily irrigation until the discharge becomes serous, when a gauze wick may be substituted and the opening allowed to close.

Since using this postoperative treatment the mortality rate has been very materially reduced and the period of convalescence shortened. We have never seen any evidence of pleural shock, which is said to occur following irrigation of the pleural cavity when this method is used. On the contrary, the continuous irrigation is very grateful to the patient, preventing cough and pain. We have also reduced the size of drainage tube used, a medium-sized tube giving free drainage with less tendency to the production of extensive pneumothorax.

Deep breathing and blowing exercises are a valuable aid in favoring lung expansion and the obliteration of the pleural space, but should not be used until all signs of cardiac weakness and respiratory embarrassment have disappeared.

Fluoroscopic examinations at frequent intervals during convalescence are of great value in detecting premature adhesions with the formation of pus pockets. Should these occur, they can be gently broken up and the pus liberated under direct screen observation by introducing a silver male catheter bent to the proper curve.

The solution we have used for local anesthesia with entire satisfaction is a one-fifth per cent eucain hydrochlorid in normal salt solution, to which 20 drops of adrenalin to the ounce are added when used. The tissues should be thoroughly infiltrated, using 30 to 40 c. c. solution and at least 10 minutes should elapse before making the primary incision. When the periosteum is reached, a few drops of a one-half per cent cocain solution injected along the upper and lower borders of the rib will render the periosteal stripping painless.

A BULLET IN THE APEX OF THE RIGHT LUNG; ITS ACCIDENTAL DISCOVERY AFTER THREE YEARS.

By F. J. Dever, Passed Assistant Surgeon, United States Naval Reserve Force.

A fireman, third-class, admitted to the United States Naval Hospital, League Island, Pa., in December, 1917, complained chiefly of pain in both scapular regions, dyspnea on exertion, and of occasional slight cough without expectoration. He was pale, and his general appearance suggested bodily weakness.

A study of the family history revealed the fact that his father, a sister, and two paternal uncles had died of pulmonary tuberculosis.

The patient stated that he had never been ill until October 25, 1914, when, while in the country, he was wounded by a bullet accidentally discharged from a revolver which he had placed, muzzle pointing upward, in the right side pocket of his coat. The shock of the injury did not cause him to fall, but he felt as though "the wind had been knocked out" of him. He lay down for a short time, then boarded a trolley car for a 20-minute ride to a hospital.

There were no symptoms to indicate the course the bullet had taken and there was no wound of exit. The wound of entrance was in the eleventh interspace about 2 inches back of the right posterior axillary line.

Immediately after entering the hospital a surgeon made an incision over the wound of entrance and another directly opposite in the anterior abdominal wall. The patient states that the doctor told him the bullet had been removed. There was some cough. About four weeks after the accident he began to expectorate brown-colored sputum, which was never examined. About two months after the shooting a small quantity of blood was expectorated. Four months later, while in bed, a paroxysm of cough occurred and he expectorated approximately 3 ounces of blood. His weight was gradually increasing and he felt well.

No further bleeding occurred until December, 1916, when one or two tablespoonfuls of blood were coughed up after he had helped to lift a roll of rubber weighing 150 pounds. No attention was paid to this hemorrhage as he still felt perfectly well.

In April, 1917, he enlisted in the United States Navy as a fireman, third class. After five or six months, most of which time he was detailed as engine-room messenger, dyspnea began and increased in severity. Because of an otitis media he was sent to the sick bay and subsequently transferred to this hospital.

Physical examination revealed a pasty complection with pallor of the conjunctivæ and gums. The area of heart dullness was increased to the left; the apex beat was palpable in the fifth interspace in the left midclavicular line. No thrill could be detected. A distinct mitral murmur transmitted toward the axilla was audible. Examination of the left lung was entirely negative. In the right supraclavicular and supraspinous fossæ percussion resonance was impaired, the breath sound was feeble and râles were not heard. The excursion of the diaphragm on the right was much less than on the left side.

The physical signs at the right apex we supposed were due to either a healed or latent tuberculosis. Because of the two scars and the statement of the patient that the bullet had been removed the history

Bullet in apex of right lung.

of the shooting was dismissed as having no bearing in the case. What then was our surprise on finding at X-ray examination a bullet in the apex of the right lung, as shown in the accompanying illustration. On the plate the course of the bullet through the lung is distinctly visible and is marked by the picture in arrows.

While in the hospital he rarely coughed, and at no time was there any expectoration. General improvement was noted and the mitral murmur disappeared. When seen three months after his discharge to duty his appearance was greatly improved and he had gained weight.

It is probably correct to deduce that—

(*a*) The pulmonary bleeding recurring during the four months subsequent to the accident was due to a low-grade localized pulmonary infection. As far as can be judged from the statement of the patient no clinical evidence of tuberculosis was observed. If tuberculosis caused the pulmonary hemorrhages, it is fair to assume that a spontaneous cure has occurred as the last hemorrhage was 16 months ago and the patient is now fit for duty.

(*b*) The physical signs at the right apex are due to cicatritial tissue about the foreign body.

(*c*) The mitral murmur was not due to a valvular defect, but was myocardial in origin, disappearing when the heart muscle regained its tone.

This case also illustrates very well the great value of the Roentgen ray as an adjunct to physical diagnosis.

CHRONIC MALARIA, A CLINICAL STUDY.

By W. C. ESPACH, Passed Assistant Surgeon, United States Navy, and E. E. MOODY and C. F. CARTER, Assistant Surgeons, United States Naval Reserve Force.

This report is based upon the study of a series of cases of malaria all of which were infected while the men were doing gunboat duty on the Panuco River near Tampico, Mexico.

The cases were about evenly divided between the tertian and estivo-autumnal types, some having been infected with both organisms.

PROPHYLAXIS.

The U. S. S. *Nashville* anchored off Tampico July 8, 1916. The mosquitoes were unusually abundant because of the heavy rains which had been falling, and the city of Tampico was full of malaria. From September 1 to December 31, all told, 1,670 deaths were reported in the city, most of which were from malaria. It is impossible to estimate the number of unreported deaths during this period, but it was probably at least a third that number.

The ship was carefully screened and precautions were taken for the prevention of mosquito bites, viz, leggings, mosquito-net helmets, and gloves were worn by the men on watch and mosquito-net tents were stretched over the beds of the men sleeping on deck. However, *no prophylactic quinine was given.*

Exactly 12 days after the ship dropped anchor the first case of malaria came down. Within 21 days 60 cases had developed. Thirty days later 48 additional new cases were under treatment with a number of reinfections or recurrences as the case might be. All told, for three months, during the period of highest infectivity (July, August, and September), 136 patients and 89 readmissions were treated for malaria. As an illustration of the percentage of infected mosquitoes, a Ward Line steamer, carrying a crew of approximately 50 and no passengers, spent one night in Tampico and had 15 cases of malaria develop in consequence.

Of the *Nashville's* crew none of the commissioned or chief petty officers had reinfections, due unquestionably to their care in following directions to prevent mosquito bites.

To summarize: 67.8 per cent of the entire personnel were infected during the eight months from July 19, 1916, to April 1, 1917. In other words, 32.2 per cent of a crew of 190 did not develop malaria in spite of the fact that no prophylactic quinine was given.

On September 15, 1917, the U. S. S. *Dorothea* reached the Panuco River with a personnel of 77. These men received the same precautionary instructions as the crew of the *Nashville,* and in addition were given quinine sulphate 0.30 at quarters once daily.

Again, 12 days after dropping anchor, the first case of malaria came down. All told, from September 15 to November 29, there were 46 primary infections, which constituted 62.3 per cent of the crew. That is to say, 37.7 per cent escaped infection with the precautions taken on the *Nashville* and the quinine prophylaxis in addition.

TREATMENT.

The total of 182 cases from the two ships received the "Canal treatment," which consists of initial purgation with magnesium sulphate followed by quinine sulphate 0.9 three times a day until the temperature is normal for five days, then 0.6 daily for 10 days. There were 211 readmissions from these cases, of which 56 were unquestionably recurrences, as they were taken with a chill during the first three months of 1917, a period during which there was only one new case admitted. Probably the greater percentage of the rest were also recurrences, but there is no way of determining absolutely whether they were recurrences or reinfections. Two of the cases from the *Dorothea* in spite of receiving quinine by mouth, as outlined above, developed cerebral symptoms, and the blood

being heavily infected with crescents intravenous quinine was given for two or three days. At the end of that time one case, which was in the United States Naval Hospital at New Orleans, was started on the routine treatment. He is included in the classification below.

Twenty-eight cases from the U. S. S. *Eagle* (to which the crew of the *Dorothea* had been transferred) were transferred to the United States Naval Hospital, New Orleans, for treatment for recurrences. Twenty of this number were given the Ochsner treatment which consists of putting the patient to bed after initial catharsis of magnesium sulphate and following with quinine sulphate 0.18 every two hours for 30 doses while the patient is on liquid diet. This treatment was given three times with six-day intervals, during which the patients received arsenic in the form of Fowler's solution in increasing drop doses. Of these 28, three still had plasmodia in their blood at the completion of the treatment and it was repeated. Two of these patients had infection with both the tertian and estivo-autumnal organisms. After the second round of treatment, none of the patients still had plasmodia in their blood.

The following system was established in an endeavor to prove whether the blood of the patients was free from plasmodia before their discharge from the hospital: Six days after quinine was administered the first blood smear was taken; six smears were taken on successive days and, if all these proved negative, after a five-day interval three more smears were taken on successive days. If all nine smears were negative, the patient was discharged as cured.

Twelve patients received a treatment consisting of quinine sulphate 0.6 by mouth every four hours for a period of five days, during which time they were given a soft diet but were allowed to be up and around. These patients were given sodium bromide to control nervousness and Fowler's solution as in the Ochsner treatment. After the completion of three rounds of the treatment, four still had plasmodia in their blood and six had distinct typical chills. All told, 10 of the 12 cases had recurrences. There is no doubt that the cases in the hospital were recurrences from the same infection that they were treated for during December, January and February, a period when there are practically no mosquitoes in New Orleans and no new cases of malaria were reported.

ADRENALIN ADMINISTRATION.

Garin, Sarrouy and Ponget [1] believe that the extreme pallor and lassitude, blanching of the mucosa, emaciation, and anorexia in malaria patients testify to suprarenal insufficiency, and they believe that a very prompt improvement can be secured by the administration of suprarenal extracts.

[1] Suprarenals in Malaria. Progrès Med. par. 39, p. 324.

All of the patients entering the hospital in New Orleans with a diagnosis of malaria presented these symptoms and were divided into three groups. The first group was given 1 mil of adrenalin chloride (1-10,000 sterile solution) subcutaneously every day; the third group was observed as controls receiving no adrenalin; the second group was given 1 mil of adrenalin chloride, 1-10,000 solution every other day. Their weight curves were recorded, their hemoglobin determination made every other day, their red blood counts and blood pressure carefully observed and the results have been plotted diagrammatically. The laboratory determinations, weights, etc., were made by the clinical laboratory men who did not know which men were receiving adrenalin and which were not. This was done in an effort to rule out the personal equation as far as was possible.

It was observed that the red counts were diminished while the men were actually taking quinine. The average of the red counts of all the malaria patients on admission was 3,840,000 after three days of quinine administration, the average of the counts was 3,650,000 and four days later it was 3,880,000.

Chart No. 1 has been plotted to show the average of the hemaglobin determinations of the three groups. It will be seen that the hemaglobin of the patients receiving adrenalin every day reached 90 per cent on the eleventh day after admission and remained there during the entire stay of the men in the hospital, while the men who received adrenalin every other day did not reach 90 until the twenty-first day and the men who did not receive adrenalin at all reached 90 on the thirty-fifth day.

Chart No. 2 shows that there was little variation in the red blood counts of the three groups while chart No. 3 which shows the weight curves of the three groups computed on the initial weight as 100 per cent, shows that in this sense the men who received the adrenalin regained weight more rapidly than those who did not receive adrenalin. It is to be noted that all men who entered this hospital with malaria were from 5 to 20 pounds under their normal weight.

Chart No. 4 shows the average of the blood pressure determinations of the three groups. By looking at the chart it will be seen that the systolic blood pressure remained about the same in all three groups while the diastolic for all patients on admission was much lower than is considered normal and much lower than the average of patients in the hospital at the same time with other diseases.

Care was taken to have the blood-pressure readings made three or four hours after the adrenalin was given in order that the initial effect of the drug would not be recorded.

Jeanselme [1] feels that malaria is rarely cured but is merely rendered latent by vigorous treatment with quinine and arsenic. He says

[1] Malaria, Jeanselme, Bul. de l'Acad. de Méd., Paris, XXVIII 10, p. 21.

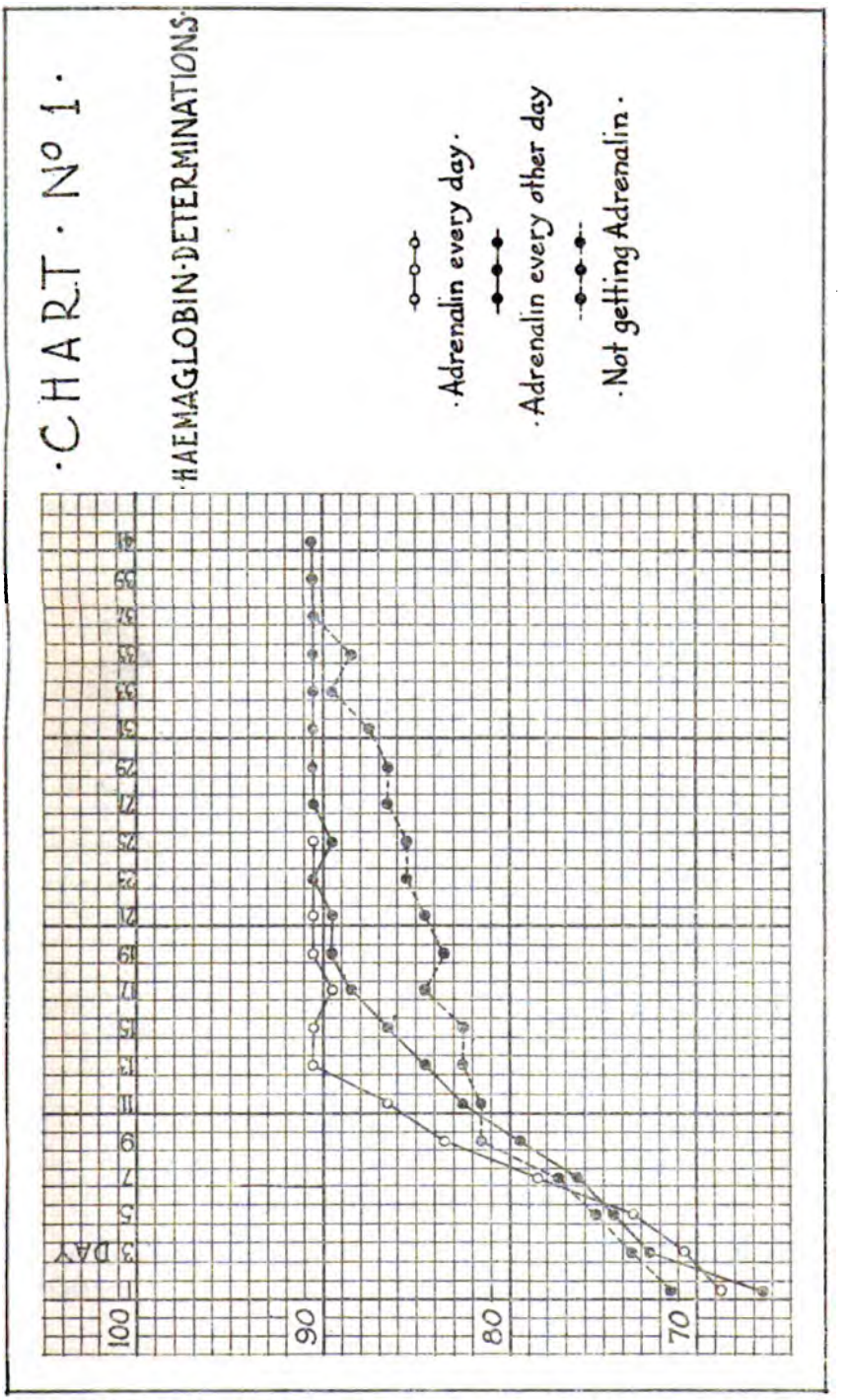
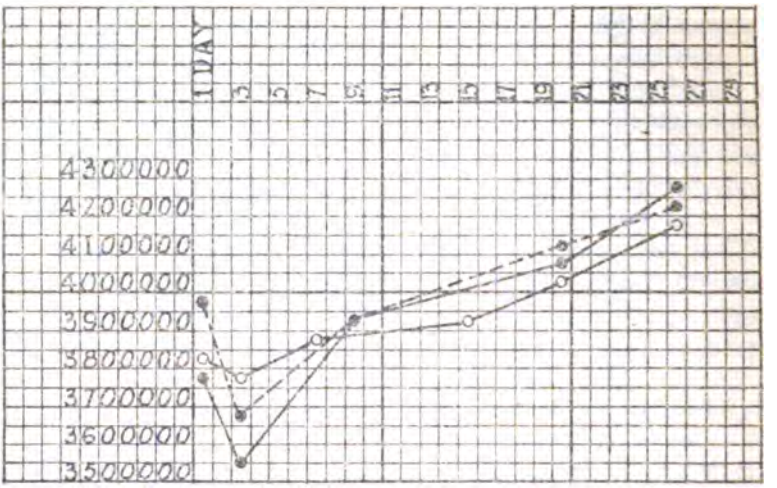


CHART · Nº 1.
HAEMAGLOBIN-DETERMINATIONS
Adrenalin every day.
Adrenalin every other day
Not getting Adrenalin.
DAY
100
90
80
70



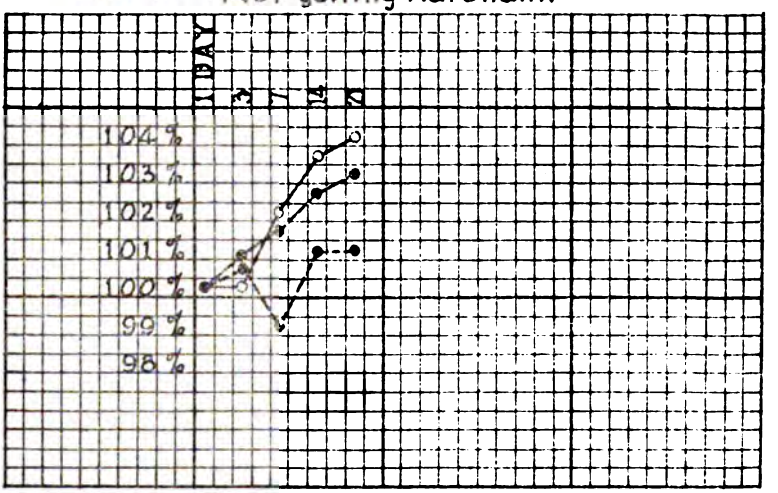
·CHART·Nº 2·

·RED·BLOOD·COUNTS···

·Adrenalin every day·

·Adrenalin every other day·

·Not getting Adrenalin·



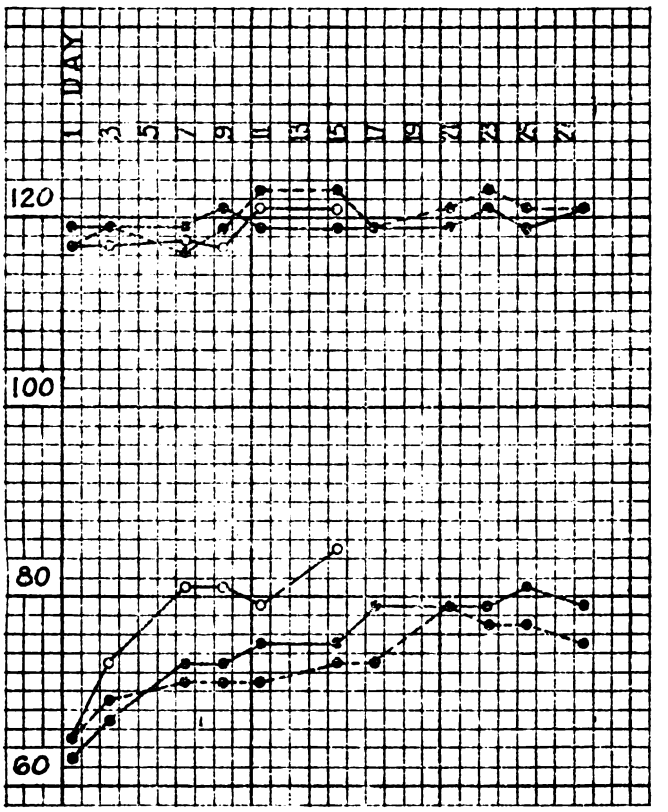
·CHART·Nº 3·

·WEIGHT·CURVE·BASED·ON·ADMISSION·WEIGHT·AS·100%·

·Adrenalin every day·

·Adrenalin every other day·

·Not getting Adrenalin·



· CHART · Nº 4 ·

BLOOD · PRESSURE · DETERMINATIONS ·

·Adrenalin every day·

·Adrenalin every other day·

· Not getting Adrenalin·

that extreme fatigue or the temporary increase in the total quantity of blood in apparently cured cases by the intravenous administration of 250 c. c. of normal salt solution will serve to bring on a typical attack with chill, fever, etc. He feels that malaria patients should be "farmed out," i. e., given outdoor work for long periods of time during which they receive treatment.

This method of salt administration (250 c. c. intravenously) was tried on six patients who were believed to be cured. These six have been observed for several weeks since receiving the salt solution and one of the six has shown a recurrence.

It has previously been reported by one of us[1] that in cases of malaria which have previously been under treatment, a rise in the pulse rate for three or four days precedes a chill. This observation was also made on eight patients in the hospital who had chills in the course of their treatment.

This is especially of value to the service man on field duty where a microscope is not always available, in that it will serve as an index for the administration of quinine in the anticipation of a chill. It was also noted in making the physical examinations that 11 men showed enlargement of both lobes of the thyroid on admission, which disappeared after the complete course of treatment.

CONCLUSIONS.

1. In this series of cases, the administration of quinine sulphate 0.3 every day did not seem to materially decrease the number of cases developing the disease.

2. The Ochsner method seemed to be most efficient in the treatment of the disease, and greater periods than two hours between dosage of the quinine seemed to render the treatment less valuable.

3. It is possible that the administration of adrenalin chloride in cases with marked anaemia, etc., may hasten their improvement. Certainly this has been true in our series. However, the series is not sufficiently large to allow any definite conclusion on this point. Following up of the method may give some valuable aid to the treatment of malaria.

REPORT OF A CASE OF ERYTHEMA BULLOSUM.

By F. W. HARTMAN, Assistant Surgeon, United States Navy.

Although erythema bullosum is not a rare disease to the skin specialist working in large clinics, it is the more uncommon of the erythema group and is seldom encountered in general practice.

The case under discussion is perhaps more typical than many of those reported because of the various unusual localizations presented

[1] Espach. Clinical notes. U. S. Nav. Med. Bull., July, 1917.

PLATE I.—LESIONS OF THE MUCOUS MEMBRANES APPEARING AT VARIOUS STAGES OF THE DISEASE.

PLATE II.—LATE ULCERATIVE AND SCALY LESIONS: SAME STAGE AS IN FIG. 2

in the same individual. Schamberg mentions almost identical lesions seen in a young colored man as we observe here.

Patient A. B., private, U. S. M. C., age 20 years. Hebrew. *Complaint.*—Skin eruption of hands and stomatitis.

Family history.—Father and mother living and well. No tuberculosis. No cancer. One brother has rheumatism. Three brothers living and well; two sisters and six brothers dead.

Previous history.—Measles and mumps as child. No serious illness since childhood. Head: no trouble with eyes until present illness. Hearing good. Tonsils large and ragged; sore throat during previous attacks. Cardio-respiratory: no shortness of breath, no palpitation, no chronic cough. Gastro-intestinal: appetite good. No nausea or vomiting. No jaundice. No abdominal attacks. Neuro-muscular: muscles of thigh feel stiff and seem to lose power at times. This comes especially before storms and patient is able to predict bad weather on this account. Genito-urinary: no venereal disease. Wassermann negative.

Illness began July 10, 1917, with a feeling of malaise and easily tiring muscles. At times it seemed as if the muscles of the legs would not support patient in walking. Several "sores" were noticed on the mucous membrane of the lips. (Pl. I.) These extended until the entire buccal mucous membrane was involved, bleeding freely and excluding all but liquid food. On the second day "bumps and blisters" came out on the palms of both hands. A diagnosis of dermatitis, unqualified, was entered in his health record with the notation that the lesions of the hands were due to washing with lye water. At the same time the eyes became red and swollen and "watered" a great deal. When tested by the medical officer the photophobia was so severe that the letters on the test card could not be seen. The lesions of the mouth improved first and then the hands so that duty was resumed in four weeks' time.

During the second attack, beginning in September, a diagnosis of dermatitis venenata was entered in the health record. Apparently this was less severe and was not associated with conjunctivitis.

On November 22 patient entered the United States Naval Hospital, Washington, D. C. At this time the lesions had been present for a week and resembled those shown in Plate II and figure 2, except that they were more confined to the palms of the hands. The entire buccal mucous membrane was covered by superficial ulcerations such as seen illustrated on the lips. Around the edges of these abrasions and completely covering them in some instances was a yellowish gray exudate.

Similar irregular superficial ulcers from one-half to 1 cm. in diameter were evenly and symmetrically distributed over the palms and to a less extent over the dorsal surface of the hands. A few bullous

lesions slightly elevated above the surface and gray in color were seen which had failed to ulcerate. Several reddish-blue blotches were present around the wrists and on the backs of the hands which, according to the history, were the site of "blisters and sores" in previous attacks. The ulcerated areas burned and itched almost constantly.

With the fourth attack the patient was again admitted to the naval hospital, and now, for the first time, as it was in its incipiency, the development and course of the affection could be understood. At first there was some injection of the conjunctivæ. Papules the size of a pinhead were seen on the backs of the hands and fingers. These seemed to come out in crops and grow larger, then a vesicle formed at the crest. (P. III and fig. 1.) After several days the exudate in the vesicles was absorbed, leaving the papule capped by a small round scale. Possibly due to irritation the scale was lost, leaving the superficial ulcer which usually became larger. At the end of the second or third week the abrasions rapidly healed, leaving the reddish-blue discoloration mentioned above.

Because of the stomatitis and the skin abrasions confined to the hands seen on entrance to the hospital during the third illness the diagnosis of secondary syphilis was favored until repeated Wassermann tests failed to give a positive reaction. Fox mentions two cases considered to be syphilis which he found to be erythema bullosum. One of these gave a history of four or five attacks of "blisters" on the lips and mucous membrane of the mouth and a macular lesion of the palms of the hands. The second case was similar and had had three recurring attacks. Our case, in addition to the lesions of the mouth resembling mucous patches, showed scaling lesions of the palms resembling papular syphilis of the palms, in which there is marked scaling, as illustrated by Fox. The history of recurring attacks and negative serum reactions should rule syphilis out. This disease must also be differentiated from dermatitis herpetiformis and pemphigus.

During the last stay in the hospital a tonsillitis developed, which left the tonsils ragged and injected. Tonsillectomy was done, the tonsils proving to be deep set and very large, containing crypts plugged with pus. On discharge it was advised that the patient be kept on small doses of salicylates. Now, four months after operation, there has been no recurrence.

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PLATE III.—EARLY BULLOUS AND VESICULAR LESIONS: SAME STAGE AS IN FIG. 1.

Fig. 1.—Early bullous and vesicular lesions.
Fig. 2.—Late ulcerative and scaly lesions.

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A CASE OF ERYTHEMA NODOSUM.

By G. A. GRAY, Assistant Surgeon, United States Navy.

According to the "Detailed statement of diseases and injuries for the calendar year of 1916," appearing in the Annual Report of the Surgeon General, United States Navy, for the fiscal year 1917, only two cases of erythema nodosum were admitted with one case of readmission. The following notes, therefore, may be of interest:

B——, G. A., private, in the band, age 24, was admitted to the sick bay of the regiment at Quantico, Va., on October 29, 1917, with the diagnosis of erythema nodosum. The following history was obtained. *Immediate complaint.* Swollen tender areas on the lower third of the anterior surface of the legs. Constipation. *Onset and course.* On October 21 the patient began to experience a "feeling of soreness" in his left leg. The lesion was of a pale red color and limited to a region about 10 inches long and 4 inches wide. Within its borders were six bluish-red, nonelevated areas about the size of a dime, the color of which faded on pressure. Private B. did not come to the sick bay for treatment until five days later (October 25), when he walked to the dispensary, and showed the lesion described above, but presented no constitutional symptoms. It was dressed with zinc-oxide ointment for two days. The patient did not report again for 48 hours.

His left leg suddenly began to get worse Sunday evening, October 28, while his right leg also became involved at that time. First the small blue-red areas, four in number, appeared, and then an area similar in size and color to that on the left leg developed, only more rapidly. He began to feel feverish and have joint pains, which made it difficult for him to get about. On Monday two men in his company helped him down to sick call. Examination then showed the lesions to be of a deeper color than previously. The distinct round areas within the larger erythematous regions were now firm nodules, about the size of a 5-cent piece in circumference, and with centers elevated about one-fourth of an inch. The entire lesion was very sensitive. Even the jarring set up by some one walking past the bed caused him

discomfort, while pressure applied directly to a nodule was extremely painful and, in the patient's words, "the pain lasted about an hour." He also complained of feeling "bilious" and that his bowels had not moved for two days.

His temperature at the time of admission was 100°. He was put to bed, given a sponge bath, and cathartics. Hot fomentations were applied to the legs. The fever on the day of admission reached 102.6° and then dropped to 100.3° by the following afternoon at 4. Three hours later the temperature had risen to 101°, when a bowel movement occurred, and then it rapidly fell to 99.6°, at which point it remained most of the following day. A light diet, free catharsis, iron, quinine, and strychnine pills, salicylates, and sodium bicarbonate, and continuous hot applications to his legs, brought the fever to normal, and caused the lesions to become less sensitive within a period of five days. In 10 days the patient was discharged to duty, as he was feeling much better and wished to accompany the regiment, which had received orders to break camp. Sixteen days later he was readmitted with a mild exacerbation of the original attack, as he had never fully recovered and had been subject to some severe weather in transit.

History.—His occupation for the six years previous to his enlistment in the Marine Corps was that of a rural mail carrier, which required him to be out in all kinds of weather.

Family history.—Negative.

Previous illnesses.—Measles, whooping cough, scarlet fever, and typhoid fever. Patient denies venereal disease; has good teeth and has rarely had throat trouble.

Physical examination.—Negative, save for the following cutaneous disorder: The patient has a mild type of ichthyosis simplex, which has been present since he was 1 year old. It gets worse in the cold weather and at times spreads over the entire body, though as a rule localized on the anterior surface of the legs. The accompanying illustrations, taken three days after the patient was first admitted, show the ichthyosis fairly well. The dark patch on the left leg represents the large erythematous area, while the smaller and darker shadows on the right leg represent the nodules of erythema nodosum. This was the best reproduction of the condition that could be obtained.

Etiology.—The fever and joint pains in this case seem to favor the theory that erythema nodosum is an infectious disorder somewhat similar to rheumatism. At the time we were unable to make a differential or leukocyte count. A Wassermann made at a later date was negative. At the onset of the malady we were having very cold weather, and I believe this had a bearing on the etiology. The constipation present favors the theory of its origin being due to an intestinal autointoxication.

Ichthyosis and erythema nodosum.

EARLY CEREBRAL SYPHILIS.

By C. A. AINSLIE, Assistant Surgeon, United States Navy.

Patient, J. M., age 27, private United States Marine Corps, entered the United States Naval Hospital, Canacao, P. I., in December, 1917, with a diagnosis of chancroid. A bubo in the left groin was also present. This bubo became worse and was opened and drained on December 10, and slowly healed until on January 30 it finally closed over. There was a small chancroid on the penis which healed about a week after entrance into the hospital. All venereal diseases seem to be more virulent in the Tropics and take longer to heal than in the more temperate climates, and this probably could account in part for the slow healing of the bubo, however a Wassermann test was done on the patient every week to detect a syphilitic infection if present.

As routine in the venereal ward here, all patients have a blood Wassermann test every Thursday; also every Monday an injection of 1 c. c. of a 10 per cent suspension of mercury salicylate in albolene is given in the buttocks. (The mercurial injections seem to hasten the healing of all venereal cases whether syphilitic or not. Latent lues will often, after one or two injections, give a positive Wassermann, and early cases will give a positive test earlier by this method than if no antisyphilitic treatment is given.)

On January 17 the patient first gave a positive Wassermann test. The next day 0.6 gram of salversan was given intravenously, this being followed a few hours later by a generalized macular rash which gradually died away in the next 12 hours. The patient's diagnosis was changed to syphilis on January 20.

January 25 a second 0.6 gram of salversan was given intravenously.

On January 27 at 4 p. m. the patient was standing near a bed, having just gotten up from reading a newspaper, when he suddenly fell over on the bed, almost immediately began to have clonic convulsions and became very cyanotic. The tongue became slightly injured by the teeth and the froth which appeared on the lips was blood tinged. In a few seconds stertorous breathing began, lasted for about an hour and then gradually subsided and the patient fell into a troubled sleep.

A like convulsion occurred at 8 p. m. and another at 2 a. m. the following morning. No localizing symptoms could be made out; no inequality of the pupils; no loss of or exaggeration of any of the reflexes; no paralysis of any part of the body; no twitching of any member, in fact nothing was found which would indicate a localized process in the brain or spinal cord. The patient needed to be constantly watched as he tossed about so much on the bed that he would have fallen to the floor if not constantly watched. Power of speech was totally lost for several days but the patient would turn his eyes toward the speaker if words were spoken with emphasis. Stupor, inconti-

nence and inability to eat were symptoms which were pronounced for three days.

On January 27 the urine was tested and found negative. Kernig's sign persistently absent.

Lumbar puncture done on January 28 and 30 c. c. of spinal fluid removed. There was no increase in pressure; laboratory tests as follows: Globulin positive—cell count done but was not accurate owing to the fact that the acetic acid used to remove the red cells did not do it. This was later remedied by making up some new solution. At this time there was a discussion as to the advisability of giving Swift Ellis treatment but that was not done and it was decided to push the administration of mercury by inunctions, potassium iodide by mouth and salvarsan intravenously.

January 29: Patient semiconscious and restless; 0.2 gram of salvarsan given intravenously.

Answers to questions put to him on January 30 show a very well marked lapse of memory, practically everything that has happened in the last six months being blotted out.

Q. "What year is this?"—A. "1916."

Q. "How long have you been in this hospital?"—A. "Since July 4, 1916."

Q. "Why is your back sore?" (spinal puncture).—A. "Another man and I were over in France and I was shot in the back."

February 4: 0.3 gram of salvarsan given intravenously. Treatment at this time was as follows: Potassium iodide, grains 10 t. i. d.—mercury inunctions every day except Sunday, rest and bath on that day; salvarsan intravenously at short intervals.

February 7: Blood Wassermann negative.

February 11: 0.6 gram of salvarsan given intravenously. One hour later 20 c. c. of spinal fluid were withdrawn by lumbar puncture and tests made. These showed—cell count 1 per c. m.; globulin negative; Wassermann and Lange tests both negative.

February 14: Patient seems to be slowly recovering his memory. He can now recall everything up to December 20 last, but nothing from that date to January 27. He acts and talks rationally and is trying to recall past events. He has no symptoms except a frontal headache which comes on every two or three days and is not very severe.

The case seemed to be worth reporting because of the following features: No syphilitic or other venereal history before the latter part of November, 1917; a negative blood Wassermann until 10 days before the cerebral symptoms came on with such suddenness; the symptoms of acute cerebral irritation with no localizing symptoms; the rapid recovery from all symptoms except a slight occasional headache when antisyphilitic treatment was intensively given.

REPORT OF A CASE OF DIABETES INSIPIDUS.

By E. E. Moody and C. F. Carter, Assistant Surgeons, United States Naval Reserve Force.

Diabetes insipidus is a relatively rare condition concerning which little is known, and there has been a great deal of discussion as to whether it is really a disease of the kidney (1) or a disease of the central nervous system, or a condition in some way related to the glands of internal secretion. Christie and Stewart (2) have proven in a number of cases that by giving posterior lobe extract of pituitary gland they were able to effect a very considerable concentration of urine and produce thereby a fluid of much higher specific gravity than the patient was able to excrete under ordinary conditions. They construe this to mean that, in certain cases at least, the kidney itself is not the determining etiological factor of the disease. Further proof is that there have been no histological alterations of the actual kidney tissue in diabetes insipidus.

Priestly (3) has measured the blood serum and proved that it shows an actual increase in relative volume upon the drinking of large quantities of water and that as a result the serum becomes more dilute and decreased in salt content. Christie and Stewart, working on this basis, found that the relative volume of serum was diminished simultaneously with the decrease in water excretion when the water intake was restricted or posterior lobe extract administered.

Most of the men who have studied the disease have attempted no definite explanation of it, and practically nothing has ever been contributed which is of value in the treatment of the disease.

It is certainly true that the disease itself is practically never the cause of death.

The following case is reported because of the probability of an hereditary tendency and because of the great rarity of such conditions in military service. The patient, E. V. G., 18 years of age, enlisted June, 1917, nothing abnormal having been found when he was examined for duty. He was admitted to the United States Naval Hospital, New Orleans, La., on November 24, 1917, with the following history:

Clinical case.—Bed wetting.

Family history.—Father and brother are very nervous, and there is a history of abnormal frequency of urination in the father and one paternal uncle. The brother, who is 20 years of age, is in the naval service.

Personal history.—The patient has had mumps, measles, and chicken-pox, all of which were very mild and of short duration. He has had no other diseases.

Present illness.—The present illness dates back to early childhood. He has always been obliged to pass urine quite frequently during the day and has been a bed wetter all of his life. The urine has never been highly colored, nor has it ever had a strong odor. The

condition has always been a source of annoyance and inconvenience, as he has practically not missed a night in the past 12 years. However, he did not consider it of sufficient consequence to necessitate his making a statement as to the condition when he was enlisted. He states that this is because he had become so accustomed to it that it did not impress him as being unusually abnormal. In October, 1917, while on ship duty, he came under observation of the ship surgeon, who tried the ordinary simple method of treating eneuresis, without any success whatsoever. When admitted to the hospital, the condition was neither better nor worse than it had been for several years.

Physical Examination.—Shows a well-nourished youth. Skin clear and of normal turgor. Ears negative. Eyes present no abnormalities. Pupils equal and react to light and accommodation. Under atropine the eye grounds were found to be normal. The nose shows a slight hypertrophic rhinitis. Throat and mouth negative. Teeth all present and in good condition. There was a marked increase of flow from all of the salivary glands, and the saliva had a faintly acid reaction. Neck: slight enlargement of thyroid gland. Chest: the lungs are apparently normal to percussion and auscultation. There is slight enlargement of the heart to the right (verified by X-ray), but the sounds are normal. Abdomen: left kidney apparently palpable but not tender. Genitalia show no abnormalities. Extremities are negative except that all finger nails have been bitten very close. Blood pressure on admission (stethoscopic), 185–158. X-ray of head shows a normal sella turcica. Red blood count 4,300,000, white blood count 11,000. Hemoglobin 70 per cent. Urine, total quantity for 24 hours 9,300 c. c., specific gravity 1.004, reaction acid, negative chemically and microscopically. An attempt was made to allow the patient as little water as possible, and after two days the total quantity for 24 hours was reduced to 5,190 c. c. The administration of 15 grams of sodium chloride every four hours immediately brought the quantity back to 9,000 c. c. For a short period of time he was given 1/200 grain of atropine sulphate every four hours by mouth without appreciable effect on the total excretion.

It was found that the only method by which the bed wetting, for which he was admitted, could be controlled was by waking the patient at one-hour intervals during the night and even then, on one or two occasions the quantity of urine passed during the night was so great that this method was not effective. A board of medical survey has recommended his discharge as being unfit for service.

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A CASE OF EMPHYSEMA OF CONJUNCTIVA AND SCLERA.

By J. P. ISRAEL, Assistant Surgeon, United States Naval Reserve Force.

This case is reported because of the rarity of the condition and because of its traumatic origin.

G. D., aged 17 years, a civilian employee of the navy yard, was admitted to the United States Naval Hospital, New Orleans, La., on December 12, 1917, complaining of inability to open the right eye after having been struck in the face by an air stream from a compressed-air hose, used to drill rivet holes. While using the machine the hose became detached from the drill gun and the stream of air was directed into his face from a distance of at least 12 inches.

There was no immediate discomfort, but he was unable to open his eye. He was sent to the hospital, and it was seen that the emphysematous condition of the conjunctiva was responsible for his inability to open the eye.

On exposure there was noted a marked swelling of the conjunctiva of the lower lid and eyeball, involving the sclera over the lower temporal quadrant extending to the sclerocorneal junction. There was no involvement of the cornea and no visual disturbance. Distinct crepitation could be felt over the involved portion.

The patient was given douches of 2 per cent boric acid solution and ice compresses were applied. The following day the edema of the lids had subsided to such an extent that he was able to open his eye, and the emphysema of the conjunctiva and sclera was subsiding rapidly.

Four days after the accident the swelling had completely disappeared and the patient was sent to duty.

Neither Fuchs nor De Schweinitz mentions emphysema due to this kind of trauma.

REPORT OF SEVEN CONSECUTIVE CASES OF MASTOID ABSCESS.

By F. A. HUGHES, Passed Assistant Surgeon, United States Naval Reserve Force.

Case No.	Date of operation.	Date when ear ceased to discharge.	Date when wound ceased to discharge.
	1918.	1918.	1918.
1	Feb. 13	Feb. 18	Feb. 28
2	Feb. 22	Feb. 25	Mar. 12
3	Feb. 28	Mar. 3	Mar. 7
4	...do.....	...do.....	Mar. 11
5	...do.....	Mar. 4	Mar. 13
6	Mar. 2	Mar. 10	Mar. 20
7	...do.....	Mar. 16	Mar. 21

The above cases were operated upon and treated under the same conditions, so permit a fair estimate of what can be expected from the method of aftertreatment used, as two of the cases were as un-

favorable for a rapid healing as would be encountered in the service. Case No. 4 had just recovered from a broncho-pneumonia following measles. Case No. 6 on the third day after operation developed a lobar pneumonia on the right side. His temperature continued high until the tenth day, when he passed his crisis and his temperature dropped to normal. After this the discharge lessened very rapidly and stopped in five days.

The treatment used was as follows: Daily irrigations of the wound and ear canal with Dakin's Solution 1 part and hot water 3 parts. Urotropin grains XV t. i. d. internally.

Conclusions: That the method of aftertreatment in these cases materially shortens the period of healing, the patients are more comfortable, and are able to be out of bed sooner than with other methods of treatment.

The average time required to entirely stop the discharge from the ear, through the canal, was 6 days, though most of them stopped in 3 or 4 days. The average time required for all drainage from the wound to stop was 18 days, though one stopped in 8 days. All dressings were discontinued and the wounds healed in from 2 to 4 days after discharge had stopped. All cases recovered with good hearing. Since the above report three more cases have been operated and are pursuing the same course in healing.

TREATMENT OF CEREBRO-SPINAL FEVER.

A review of 138 cases, with a mortality of 21 per cent.

By W. E. GOLDEN, Assistant Surgeon, United States Navy.

The successful treatment of epidemic cerebro-spinal meningitis depends essentially upon the early diagnosis of the case followed by an early and efficient administration of antimeningococcic serum. The serum should be administered both intraspinously and intravenously in amounts sufficient to overwhelm the infection within the first 24 to 48 hours, the mode of administration and the amount given depending upon the clinical type of the case.

The disease may be divided roughly into three clinical types, the systemic type, an involvement of the blood stream with little or no meningeal signs, the meningeal type with clinical signs of the involvement of the coverings of the brain and cord, and the combined type with both systemic and meningeal involvement.

In the systemic type the manifestations are those of severe toxemia bordering on to the typhoid state, the temperature usually is subnormal at the onset, but may rise to extreme hyperpyrexia. I have observed temperatures of 108.6° and 108.9°, respectively, just before death. The pulse is usually between 120 and 150, extremely weak and thready; the respiration from 25 to 40 and usually shallow.

There may be a muttering delirium, but unconsciousness is rare, while in mild types the mind is usually clear. Lumbar puncture usually shows an increase of clear fluid in proportion to the increase in temperature, with normal cell count negative to globulin, and meningococci. Vomiting is the rule and hematemesis is not uncommon. The rash is always present, and may consist of numerous petechiæ over body and limbs, or in very severe cases of hemorrhagic blotches over the entire skin, conjunctiva, and mucus membranes. The blood culture in early cases is usually positive to meningococci.

The meningeal type is characterized by marked signs of meningeal involvement. Rigid neck and marked Kernig's sign are usually present. The reflexes are increased, and Babinski's sign may usually be demonstrated. The patient may or may not be unconscious, although there is always some mental lethargy. Vomiting is the rule and may be projectile in type. The temperature ranges from 99° to 103°, the respirations from 16 to 24 and are usually deep and laborious; the pulse may vary from 48 to 110, is usually full, and strong and is generally in inverse ratio to the temperature. Lumbar puncture reveals a cloudy fluid, under high pressure containing many pus cells, usually positive to meningococci and reacting to the globulin tests.

The combined type is the most frequent and most fatal if not checked by early treatment. The systemic type if not checked in early stages will usually develop meningeal complications. The symptoms are a combination of the symptoms of the two above-mentioned types.

I consider that cerebro-spinal fever is a blood-borne disease, localizing in the meninges as a point of least resistance or predilection, and should be treated accordingly, both systemically by intravenous administration of serum and locally by intraspinous administration. To be successful in the local treatment of the cerebro-spinal symptoms, the means of transportation of the infection must be blocked, and this is best done by intravenous injection of antimeningoccic serum. As soon as the patient is admitted and the diagnosis is made from a clinical standpoint, a lumbar puncture is done for confirmation. If the rough fluid findings indicate it, an equivalent amount of serum—that is, 10 to 15 c. c. less than the amount of fluid removed—is injected intraspinously at the same sitting. The patient is then turned on his back and from 20 to 40 c. c. of serum is injected into the median vein. Undiluted serum is used and may be injected by gravity or very slowly with a piston syringe. There is usually more or less shock following this intravenous administration, and the physician should make it a point not to leave the bedside of the patient in less than 30 minutes after completing the injection. The heart increases in rate and the pulse may become almost imperceptible; the respira-

tions increase in rate and are very shallow and sometimes may cease entirely. Artificial respiration and administration of oxygen has always carried my cases past this stage. This marked cardiac and respiratory involvement, if it occurs, usually begins within 10 minutes after the injection of serum, and does not last as a rule for more than 5 to 15 minutes, and may be followed by a chill, which in turn is followed by an almost uniform rise in temperature of from 2° to 4°. After a few hours the temperature begins to fall and in the majority of cases has reached normal on the second day. As a rule one intravenous injection is enough to curb the systemic infection, as is manifested by the fading petechiæ, which by the second day are usually brownish pigmented spots and have disappeared entirely by the fourth to fifth day.

To clear the meninges of infection more persistent treatment is required, the initial lumbar puncture and injection of antimeningococcic serum is repeated in 8 hours and as much fluid as possible is withdrawn and serum is injected. This is repeated every 24 hours, or oftener if symptoms of increased pressure indicate it, until the spinal fluid is clear, or persistently negative to meningococci both in smear and culture, as I have found several fluids which continued cloudy under repeated treatment, but if left for two or three days until absorption was complete, returned clear and patient made an uneventful recovery.

The danger of withdrawing a large amount of fluid may be discussed. In dealing with young adults, I think that all the fluid possible should be withdrawn, but the drainage should be slow and gradual, and followed by immediate injection of serum. In this manner the release of pressure is gradual, and the vessels dilate slowly with no danger of rupture, and with no symptoms but a severe headache, which is relieved, together with the danger of diapedesis, through the relaxed vessel walls, by the equalization of pressure on the injection of the serum.

A certain general and symptomatic treatment must be carried out in conjunction with the specific serum treatment. Rest is essential and is best obtained by use of morphine or other opiates. Veronal and chloral have been useful in cases not reacting to opiates. Digalen and atropine have been most successful as cardiac and respiratory stimulants. The throat and nasal passages are cleansed three times daily with an oily antiseptic preparation and the eyes irrigated twice a day with boric-acid solution, as a protective measure.

The diet consists of liquids while the temperature is above 101° or in the acute stage, and is supplemented as soon as advisable by a soft diet.

The complications are treated symptomatically as they arise, the most frequent being a serum arthritis occurring from 7 to 12 days

after the first administration of serum. At first the inflammatory stage is treated by immobilization by splint if possible, and later, when inflammation has subsided, massage aids in removing any exudate. An arthritis sometimes is found at the onset of disease, but usually clears up after intravenous injection of serum. Other complications, as otitis media, paralysis of ocular muscles and panophthalmitis, are treated as they arise.

In conclusion I wish again to emphasize the necessity of rapid and efficient administration of antimeningoccic serum in amounts sufficient to overcome infection. This is accomplished by early injection of serum intravenously in conjunction with intraspinous treatment.

Review of 138 cases, from Oct. 30, 1917, to Mar. 20, 1918.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total.
Number of cases	2	5	22	94	11	4	138
Number of deaths	1	1	7	19	.....	1	29

Per cent deaths, 21.

Showing hemorrhagic rash	[1] 83
Received unconscious	[2] 59
Showing rigid neck and Kernig's sign	129
No meningeal sign, but with hemorrhagic rash	9
No meningeal signs, petechiae present, spinal fluid positive to mening	7
No meningeal signs, petechiae present, spinal fluid negative blood culture, positive to meningococci	2
Received unconscious and with hemorrhagic rash	18
Received unconscious, with hemorrhagic rash—died	16

TREATMENT OF FRACTURE OF NASAL BONES.

By E. A. KNORR, Assistant Surgeon, United States Naval Reserve Force.

Fracture of the nasal bones is a fairly frequent occurrence at the navy yard, Norfolk, Va., all the cases reporting for treatment at the yard dispensary being due to direct violence, and the fracturing agent in most cases being a fist. In all the cases treated here both nasal bones were broken. The nasal processes of the superior maxillary bones were involved in prominent noses, but not when the patients were negroes, as in them the nasal processes are less prominent, are rather thick and occupy a more protected position. The line of fracture extends into the bony portion of the nasal septum, and the fracture is compound internally and accompanied by nose bleed. When the fracture is due to the impact of a human fist, it is not likely to be compound externally.

If there is an external wound, apply tincture of iodine and collodion. Place the patient in a chair with a headrest. Steady the

[1] Per cent, 60.1. [2] Per cent, 42.9.

head by securing a good grip with the arm and applying the thenar emminence of the hand of the free arm against the convex side of the patient's nose, exerting steady, increasing pressure laterally until the bone is pressed into place. A distinct crepitus is felt as the fracture is reduced.

If there is marked depression of the fragments, cocainize the depressed side of the nose by the application of 8 per cent cocain solution, allow 5 minutes for anesthetization and shrinking of the turbinate bodies. Introduce the little finger or, if there is sufficient room, the index finger covered with vaseline into the nostril and push the depressed fragments into place.

A broken nose when replaced in the middle line of the face shows very little tendency to resume its former position of deformity and can be held in place by a splint made of sheet metal applied to the outer side of the nose and held there with strips of adhesive plaster so applied as to exert slight traction against the direction of displacement. Depressed fragments of bone when pushed into position from within the nose retain their proper place fairly well. The nasal splint is removed in two days, cleansed and reapplied. It can be dispensed with on the sixth day, as a broken nose usually heals promptly, and for this reason reduction should be accomplished without delay. Internasal splints and tampons can be dispensed with, as they incur the risk of infecting the sinuses by interfering with the ventilation and drainage of the nose.

TREATMENT OF FRACTURED MANDIBLE.

By D. J. ALEXANDER, Assistant Dental Surgeon, Dental Reserve Corps, United States Navy.

Case 1.—Jaw fractured while fighting. Presented himself for treatment three days later. Side of face much swollen, and complicated by a burn, as large as a half dollar, just below and to the left of the mouth, on the left side.

Each posterior tooth was wired to its opponent, as far forward as the cuspid on each side, and then the wires were twisted together, which brought the teeth in occlusion and of necessity brought the fractured ends of the maxilla in opposition.

An X-ray taken next day showed the bones and teeth not quite together. A few twists on each wire on the injured side corrected this. The ends of the wires were then covered with modeling composition to protect cheek, etc.

No originality is claimed for the above method, which is taught at many of the dental schools.

The method of external fixation originated with this case, owing to the burn, and for economy in bandages.

Case 1.—Fractured mandible.

Case 2.—Fractured mandible; marked displacement.

It was thought best to take a strip of adhesive plaster 1½ inches wide, leave the crinoline covering on, and overlap the ends, so that the plaster would not stick to the hair. This was passed around the head, just above the external occipital protuberance behind, and the ciliary ridge in front, and stuck firmly together; then in the same manner two strips were passed from this over the top of the head, one just in front and the other just behind the ear and stuck together. The entire piece could then be lifted off, and be replaced at will (this is called "the convenience headpiece").

A felt splint was padded and held firmly in place by another strip of adhesive plaster passing entirely around the splint and over the top and stuck fast to the anterior strip of the headpiece. This left plenty of room to treat the burn.

The mouth was cleansed daily, and the temporo-mandibular joint massaged with soap liniment frequently.

Patient was fed on liquid diet and maintained his normal weight.

Splint and wires were removed after 21 days. Teeth were in excellent occlusion and the fractured ends firmly united.

Case 2.—Lower jaw fractured on both sides and compounded into the oral cavity on the right side with great displacement, caused by a fall of 25 feet. The patient had a hammer in his hand and struck his jaw with same upon landing on deck. Photograph shows fractures reduced and perfect occlusion.

SUMMARY.

This method seems to the writer ideal for military services:

1. Because of the economy in time and materials used no bandages and but a few inches of Angle's fracture wire and a large strip of adhesive plaster being necessary. The adhesive plaster and headpiece keep clean and remain in place, which is next to impossible with bandages.

2. Because when the fracture is posterior to the last erupted tooth, Angle's bands and screws can not be used.

3. Because at most of the naval and other military stations, the equipment and materials are not available for making interdental splints.

4. This method of external fixation is much better than a Barton or modified Barton bandage.

1. Showing occlusion obtained in case 2.
2. "Convenience headpiece" for attachment of jaw bandages.

PROGRESS IN MEDICAL SCIENCES.

REVIEWERS.

Surgeon G. B. TRIBLE, United States Navy.
Passed Assistant Surgeon D. G. SUTTON, United States Navy.
Passed Assistant Surgeon G. F. CLARK, United States Navy.
Passed Assistant Surgeon W. A. BLOEDORN, United States Navy.

GENERAL MEDICINE.

SCHOONMAKER, H. **Hydrotherapy of heart disease.** Clifton Med. Jour., N. Y. January, 1918.

The author describes the physiological effects of the full immersion bath at various temperatures and shows its therapeutic possibilities in cardiac disease with indications and contraindications for its use.

The temperature at which water is applied to the skin is divided into three zones, namely—

Neutral	93° to 98 F.
Hot	98° to 110 F.
Cold	below 93°.

A tub bath in the neutral zone without modification by chemicals is sedative to nervous, vascular, and muscular systems. If prolonged, it is a cardio vascular depressant. It is therefore negative, and possibly injurious in relation to heart disease, except in palpitation or the tachycardia of Graves's disease. In this condition general sedation is indicated and a 10 to 20 minute full immersion bath in the neutral zone is often good treatment.

A tub bath in the hot zone is actively stimulating to sensory and vasomotor nerves, inducing quick flushing of capillaries, a rise of temperature, increase in heart rate, perspiration, and secondary cardiovascular depression. It is therefore contraindicated in the treatment of a weak heart.

A tub bath in the cold zone produces the following physiological effects: Stimulation of sensory nerve ends, contraction of muscle fibers of skin and capillaries, secondary stimulation of vasomotor nerves with relaxation of muscle fibers of skin and capillaries, flushing of capillaries, contraction of arterioles with elevation of blood pressure. It also excites inspiration and expiration, thus lessening the burden of the right heart and by flushing the capillaries lessens the burden of the left heart. Thus a cold-zone bath produces a mild

gymnastic treatment for the heart, with relatively little peripheral resistance.

It is apparent, then, that in the hydrotherapy of heart disease, the object being improvement in cardiovascular tone, baths should be given in the cold zone or in the neutral zone approximating the cold.

If the cardiovascular system responds to the cold bath, the clinical evidence is a slowing of the pulse, an increase in pulse volume, an increase in the volume of the first heart sound, a shortening of the diameters of the heart, and a sense of well-being on the part of the patient.

The author regards the Nauheim system as of great value, as it enables a full immersion bath to be taken comfortably at much lower temperature.

The essentials of the Nauheim system are: A stimulating tub bath in water containing various amounts of salts, chiefly sodium chloride, calcium chloride, and carbon dioxide. The salts act as skin irritants and encourage capillary dilatation. The gas is also a skin irritant and at the same time conserves the body heat by virtue of the layer of globules which forms upon the skin. The gas is a nonconductor. This combination of flushed capillaries and slow heat radiation makes comfortable a cold bath.

It is the rule to give 18 to 20 baths, beginning at 94 F. and 7 minutes' duration and to diminish the temperature 1° and increase time 1 minute every second or third bath until 86° and 16 minutes are reached. At the same time, the saline and gas contents are gradually increased. The patient should be fully relaxed, and care should be taken not to rub the gas from the skin.

The author considers hydrotherapy indicated in myocardial insufficiency providing the skin capillaries react and the reserve force of the heart be not lost.

It is contraindicated in advanced valvular disease, with lost compensation until compensation is being restored.

Hydrotherapy is contraindicated in acute dilatation due to overstrain in advanced infectious myocarditis, advanced fatty heart, and the terminal stage of cardiorenal disease; also in advanced arteriosclerosis and in typical mitral stenosis.

The hydrotherapy of angina pectoris depends on the underlying cause. If this be coronary or general arteriosclerosis, the warm baths are indicated. If due to a dilated heart, in the absence of sclerosis and kidney disease the graduated cold baths are indicated.

The author arrives at the following conclusions in the hydrotherapy of heart disease:

1. Hydrotherapy in heart disease is based on physiological response to stimuli, and is therefore scientific.

2. In hydrotherapy there are more possibilities for good in the treatment of heart disease than in any other single agent except rest.

3. The saline carbonated bath is especially helpful in the treatment of heart disease because it makes possible the giving of cold tub baths without undue shock and provides a wide limitation in temperature, time, and strength of bath.

4. As a therapeutic agent, hydrotherapy is not incompatible with any other.

(W. A. B.)

KURITA, T. **Tuberculosis of penis.** Bull. Nav. Med. Assn. of Japan, March, 1918.

Fleet Surgeon T. Kurita, I. J. N., reports a case of tuberculous ulcer of the penis in a man of 22, of fair physique, well nourished, apparently healthy. In May, 1916, he was admitted as a patient to the Yokosuka Naval Hospital and repeated Wassermanns were made under the conviction that the ulcer was specific, but the tests were invariably negative. Antisyphilitic and antiseptic treatments were persisted in without benefit. The subjective symptoms were slight, the course chronic. The ulcer itself was irregular in shape with undermined sharply cut edges. Secretion was scant, but the vicinity of the ulcer was distinctly infiltrated. The base had a yellowish gray fur on bright red granulations. A histological examination of the ulcerous tissue proved it to be a tubercular nodule.

On inquiry it developed that the patient had frequently and for a considerable period consorted with the same courtesan, who *angusti introitus causa* was in the habit of moistening the labia with her own saliva before each act of sexual congress. Preceding the development of the typical tuberculous ulcer there had repeatedly appeared on the penis many small reddish nodules with a yellow point in the center.

(It is a matter of regret that the English abstract of the original Japanese article does not contain any statement regarding the health of the prostitute apparently impugned as the source of the infection.)

MENTAL AND NERVOUS DISEASES.

COLLIE, J. **Notes on the management of war neuroses and allied disorders in the Army.** Mental Hygiene, vol. 3, No. 2, January, 1918.

During the past few months there have been numerous articles and special reports written by men of unquestionable reputation, on this subject, but for obvious reasons, few if any of these articles have reached the public press.

The material, as treated by the author in this case, is quite valuable to those of us in the service and it is recommended for careful reading, by those who are interested in the subject, or, those who expect to be actively engaged in work of this character. These statistics from Europe of course involve only the Army, but it can be very well

realized that neuroses of the character discussed would arise in the Navy, after an engagement involving ships of the dreadnaught class. The psychogenic make-up of the individual is the basic element involved in each case, of course, but there are certain predisposing causes cited by the author which are well worth taking into consideration. He enumerates fear, fear of being afraid, terrifying experiences, want of sleep, exposure to cold and wet, appalling sights at the front, suppression of emotions, etc. These conditions extending over a period of days produce mental irritability, loss of self-control and subsequently insomnia with the final reaction of intense emotion. The symptoms seen may be very mild or severe, simulating any neurological picture known and in many cases suggesting hysteria to the expert investigator. In fact the element of hysteria, in many of the regiments, especially those of the Canadian Army has been accentuated by the officers in charge as essential in outlining prophylactic means. Handling the condition from this angle the officers have told troops that they did not believe in such a thing as shell shock and the reviewer has been told, by a major of the Princess Pat Canadian Regiment, that even though that regiment had been rebuilt over 15 times, since the beginning of the war there had not been a single case of shell shock develop. This officer explained that the conditions of shell shock in other regiments had made their appearance in the interval immediately after a very severe engagement and before the soldiers had had an opportunity to regain their normal poise. If just at this time non-commissioned officers and regimental officers come in touch with a case that seems to be emotionally, literally shot to pieces, they have a talk with the man, reassure him, tell him that there is no such thing as shell shock, and by that means get him back on his feet. The characteristic symptoms of the condition as given by the author are disordered action of the heart, epileptiform seizures, tremors, functional loss of power of muscles, loss of flesh, impairment of the special senses, mental lassitude, giddiness, nightmares, loss of control, loss of power of concentration, fear of closed spaces, a vague feeling of apprehension, confusion of thought and frequently a functional paralysis of a group of muscles, simulating a foot or wrist drop. In the latter group of cases the diagnosis is, of course, cleared up by the reaction of the involved muscles to electrical stimulation.

It has been suggested that the pathology of the condition is minute hemorrhages into the nerve tissue, usually supported by increased cerebro-spinal pressure, as elicted by a lumbar puncture.

The chief manifestation, of course, is a perversion of mental outlook, requiring psychological treatment, involving kindness, combined with firmness and unswerving faith in an ultimate recovery.

During the first year of the war all or practically all of these cases of neuroses were transferred to the base hospital in the rear and subsequently to special hospitals in England, but within the past six or eight months, or possibly longer, authorities have recognized the value of treating all of these cases in the immediate vicinity of the trenches. The cases that were treated in the base hospitals or far in the rear of the fighting zone, in England, demanded a very long period of active massage, electrical treatments and reeducation, but since the cases have been handled in the immediate vicinity of the trenches the average number of sick days per case has decreased markedly and a large percentage of the men are being returned to active duty. In fact, our records of the cases of severe shell shock, in which the functional paralyses were simulated there has frequently been a record of full recovery in a short period and the man has, in some instances, received a medal for bravery for subsequent fighting in the trenches. The important basic principles involved in the treatment seems to be reassurance, appreciation by the patients that their fears are abnormal, that their mental outlook is perverted and, above all, that there is no question but that they will get entirely well. Associated with this psychological treatment, of course, is rest, massage, both manual and electrical, and finally reeducation along the lines of graded exercise and work.

(D. G. S.)

RIVERS, W. H. R. **Repression of war experience.** Proc. Roy. Med. Soc., London, January, 1918.

Reference is made at the outset of this very interesting paper to the use of the word "repression" in two senses. It may mean the "*process* whereby a person endeavors to thrust out of his memory some part of his mental content," and again it may be used "for the *state* which ensues when, either through this process or by some other means, part of the mental content has become inaccessible to manifest consciousness. In this paper the author uses repression to designate an active voluntary process by which it is attempted to remove some part of the mental content out of the field of attention with the aim of making it inaccessible to memory and producing the state of suppression." In this sense *repression* is not a pathological state but a necessary element of education in all social progress. "It is not repression in itself which is harmful, but repression under conditions in which it fails to adapt the individual to his environment."

"It is in times of special stress that these failures of adaptation are especially liable to occur, and it is not difficult to see why disorders due to this lack of adaptation should be so frequent at the present time. There are few, if any, aspects of life in which repression plays so prominent and so necessary a part as in the preparation for war. The training of a soldier is designed to adapt him to act calmly and

methodically in the presence of events naturally calculated to arouse disturbing emotions. His training should be such that the energy arising out of these emotions is partly damped by familiarity, partly diverted into other channels. The most important feature of the present war in its relation to the production of neurosis is that the training in repression normally spread over years has had to be carried out in short spaces of time, while those thus incompletely trained have had to face strains such as have never previously been known in the history of mankind. Small wonder that the failures of adaptation should have been so numerous and so severe.

"The process of repression does not cease when some shock or strain has removed the soldier from the scene of warfare, but it may take an active part in the maintenance of the neurosis. New symptoms often arise in hospital or at home which are not the immediate and necessary consequence of war experience, but are due to repression of painful memories and thoughts, or of unpleasant effective states arising out of reflection concerning this experience."

The author attempts to show, by citing cases successfully treated, that many of the sufferings of war-neurosis patients are due not so much to the strain of battle as to the attempt to banish from the mind distressing memories of warfare of "painful affective states which have come into being as the result of war experiences."

The natural tendency is to try to thrust aside painful memories, just as it is natural to try to avoid horrible actualities. Such a disposition is increased in those whose resistance has been lowered by the prolonged life of the trenches or other burdensome incidents of war. Not only do they do this instinctively, but friends, relatives, and physicians urge such a course upon them. They are even told not to talk with other patients or with visitors about anything relating to the war and to confine themselves to other topics, such as the beautiful scenery and pleasant features of life. This is a wise policy in general. To many patients the constant inquiries about war experiences are extremely annoying, not only through the revival of distressing scenes, but because of the patient's sense of the utter impossibility of conveying to his hearers any adequate conception of war's realities. Then there is a disposition for men associated closely in hospitals to keep harking back to the scenes they have been through and to get more than ever "fed up" with the whole business. But it is one thing for the victims of shock and strain to avoid dwelling continually on what they have seen and felt and quite another to banish it altogether from the mind. The author cites numerous cases of patients who were unable to banish the memories in question and whose symptoms were distinctly aggravated by the constant effort to do so, as advised and directed, which, if partly successful during the daytime, only brought the horrors of war more forcibly before

them by night, robbing them of needed sleep. In these cases the author talked with the patients and frankly admitted the difficulty of banishing disagreeable memories, advising that the effort be renounced and at the same time suggesting a slight modification of the ordinary line of thought, which robbed the scenes and experiences of some of their frightfulness when revived. For example, an officer had been buried by a shell explosion and suffered from a certain degree of cerebral concussion. In spite of severe headache, vomiting and disorder of micturition, he remained on duty for two months. He then collapsed after the trying experience of going out to seek a fellow officer and finding his body blown to pieces, head and limbs scattered about, wholly separated from the trunk. From that time on he was haunted by visions of the mangled dead friend. He had a horror of the night because of the dreams and visions which beset him. The day was terrible, partly from memories and fruitless attempts to banish them and partly from dread of the habitual nocturnal suffering. The constant effort to banish the painful recollections appeared to aggravate his situation. The author's advice was to relax from the persistent effort to forget, and he invited the patient's attention to the fact that the horrible state in which he had found his friend was conclusive evidence that the unfortunate victim had died instantaneously and so had been spared the prolonged agony that accompanies many injuries. This line of thought gave partial instant relief and in time the patient recovered his balance completely. In other cases "the cessation of the repression was followed by the disappearance of the most distressing symptoms and great improvement in general health.

"After one of my patients had for long baffled all attempts to discover the source of his trouble, it finally appeared that he was attempting to banish from his mind feelings of shame due to his having broken down. Great improvement rapidly followed a line of action in which he faced this shame and thereby came to see how little cause there was for this emotion. In another case an officer had carried the repression of grief concerning the general loss of life and happiness through the war to the point of suppression, the suppressed emotion finding vent in attacks of weeping, which came on suddenly with no apparent cause. In this case the treatment was less successful, and I cite it only to illustrate the variety of experience which may become the object of repression.

"Another complicating factor which may have entered into the therapeutic process in some of the cases is reeducation. This certainly came into play in the case of the patient who had the terrifying dreams of his mangled friend. In his case the cessation of repression was accompanied by the direction of the attention of the patient to an aspect of his painful memories which he had hitherto

completely ignored. The process by which his attention was thus directed to a neglected aspect of his experience introduced a factor which must be distinguished from the removal of repression itself. The two processes are intimately associated, for it was largely, if not altogether, the new view of his experience which made it possible for the patient to dwell upon his painful memories. In some of the other cases this factor of reeducation undoubtedly played a part, not merely in making possible the cessation of repression but also in helping the patient to adjust himself to the situation with which he was faced, thus contributing positively to the recovery or improvement which followed the cessation of repression.

"A more difficult and more contentious problem arises when we consider how far the success which attended the cessation of repression may have been, wholly or in part, due to faith and suggestion. Here, as in every branch of therapeutics, whether it be treatment by drugs, diet, baths, electricity, persuasion, reeducation, or psychoanalysis, we come up against the difficulty raised by the pervasive and subtle influence of these agencies working behind the scenes. In the subject before us, as in every other kind of medical treatment, we have to consider whether the changes which occurred may have been due not to the agency which lay on the surface and was the motive of the treatment but at any rate, in part, to the influence, so difficult to exclude, of faith and suggestion. In my later work I have come to believe so thoroughly in the injurious action of repression, and have acquired so lively a faith in the efficacy of my mode of treatment, that this agency can not be excluded as a factor in any success I may have. In my earlier work, however, I certainly had no such faith, and advised the discontinuance of repression with the utmost diffidence. Faith on the part of the patient may, however, be present even when the physician is diffident. It is of more importance that several of the patients had been under my care for some time without improvement until it was discovered that they were repressing painful experience. It was only when the repression ceased that improvement began.

"When I find that a soldier is definitely practicing repression, I am accustomed to ask him what he thinks is likely to happen if one who has sedulously kept his mind from all thoughts of war, or from special memories of warfare, should be confronted with the reality or even with such continual reminders of its existence as must inevitably accompany any form of military service at home. If, as often happens in the case of officers, the patient is keenly anxious to remain in the Army, the question at once brings home to him the futility of the course of action he has been pursuing. The deliberate and systematic repression of all thoughts and memories of war by a soldier can have but one result when he is again faced by the realities of warfare.

"Several of the officers whose cases I have described or mentioned in this paper were enabled to return to some form of military duty with a degree of success very unlikely if they had persisted in the process of repression."

The author concludes with the reminder that, while he deprecates the "ostrichlike policy of attempting to banish them from the mind," he is far from recommending that thought be concentrated on painful memories. "On the contrary, in my opinion, it is just as harmful to dwell persistently upon painful memories or anticipations, and brood upon feelings of regret and shame, as to attempt to banish them wholly from the mind. It is necessary to be explicit on this matter when dealing with patients. In a recent case in which I neglected to do so, the absence of any improvement led me to inquire into the patient's method of following my advice, and I found that, thinking he could not have too much of a good thing, he had substituted for the system of repression he had followed before coming under my care one in which he spent the whole day talking, reading, and thinking of war. He even spent the interval between dinner and going to bed in reading a book dealing with warfare.

"There are also some victims of neurosis, especially the very young, for whom the horrors of warfare seem to have a peculiar fascination, so that when the opportunity presents itself they can not refrain from talking by the hour about war experiences, although they know quite well that it is bad for them to do so. Here, as in so many other aspects of the treatment of neurosis, we have to steer a middle course. Just as we prescribe moderation in exercise, moderation at work and play, moderation in eating, drinking, and smoking, so is moderation necessary in talking, reading, and thinking about war experience."

HYGIENE AND SANITATION.

LUSK, G. **Food in war time.** W. B. Saunders Co., Philadelphia: 1918.

This is largely a reprint of articles which have previously appeared. It is a little work of 45 pages divided into 3 chapters: I, A balanced diet; II, Calories in common life; III, Rules of saving and safety.

Attention is called to the diet of the Italian laborer, consisting of corn meal, bread, cabbage or other green food with garlic and oil. The author considers a diet of corn meal, the cheapest of all cereals, a vegetable oil cheaper by far than animal fat, with the addition of cabbage or beet tops, a balanced diet and "capable of maintaining mankind from generation to generation." The claim is that the green leaves furnish the vitamines present in butter fat but absent in olive oil. Lusk lauds the value of milk as a food, and maintains that when it is taken with other foods, meat may be dispensed with. An

ideal diet is described as consisting of bread, potatoes, fruit, and a pint of milk. Parenthetically it may be remarked that Dr. Graham Lusk is related to Sylvester Vegetable Graham. Dr. Lusk says "Taking meat even in large excess is not harmful, but it represents luxury and waste." It is claimed that neither in England nor in Germany has the meat reduction in the diet produced any untoward results. A British commission has reported to Parliament that it takes three times as much fodder to produce beef as it does to produce milk or pork of the same food value. "Since cows eat chiefly hay and grass and pigs eat grain, the cost of the production of a unit value of milk is much less than the cost of the same value in the form of pork. It takes only 50 per cent more fodder to produce veal than to produce pork. Milk, pork, and veal have long been protein-containing foods of nations on the Continent of Europe. * * * It would save food for milk production if steers were eaten as veal and not fattened up into beef cattle. A suitable tax on all steers over a year old will accomplish this result." The author strongly advocates the increase of the dairy business at the expense of the butcher, claiming that "a well-nourished cow during a single year will give in the form of milk as much protein and two and one-half times the number of calories as are contained in her own body. Dr. Lusk extols the merits of corn sirup or Karo, pronouncing it wholesome and a valuable substitute for sugar. I wish very much that he had expressed an opinion on old New Orleans molasses, which has individuality, whereas corn sirup, or Karo, is peculiarly tasteless and insipid. In Chapter III, Rules of saving and safety, he urges that no family of five persons buy any meat until they have bought three quarts of milk, the cheapest protein food. He urges the consumption of oleomargarin and vegetable oils in preference to butter and cream. With the vegetable oils it is essential that cabbage, lettuce, or beet tops be taken to supply vitamines. Fresh fish, fruit, and vegetables are recommended and we are allowed raisins in our rice pudding because raisins contain sugar.

The utilization after appropriate treatment of condemned meat. (Report of the meeting of the Council of Public Health and Hygiene, Department of the Seine, April 27, 1917.)

It is well known that certain meats which the sanitary inspectors at the slaughterhouse interdict as food can be rendered safe and then sold at low cost in the interest of the consumer of very limited means. The sanitary services of Belgium, Germany, Holland, and Sweden have reported fully on this practice. Between 1898 and 1910, in 14 cities of Belgium, over 2,000,000 kilograms of condemned meat were sold after it had been rendered fit for consumption by sterilization. In Holland a similar practice has been increasingly popular since

1898. In 1912 there were 11 cities which had special shops at the slaughterhouses for the sale of tuberculous meat. At Rotterdam, between 1898 and 1908, two thousand and odd beef carcasses and one thousand two hundred and odd hogs were put on the market after sterilization by heat. In Amsterdam, in a nine-year period, one thousand two hundred and odd beef carcasses and one thousand five hundred and odd hogs were so treated and disposed of. .

In Bâle, Zurich, and Berne tuberculous meat is sterilized and put on sale in special shops.

Since 1901 the French town of Roubaix has had installed in its public abattoir a horizontal autoclave of the Godon model, intended to sterilize the flesh of tuberculous cattle. The flesh is subjected for three hours to a temperature of 110 C. It is then cut into pieces weighing from 3 to 4 kilos and sold in large or small quantities when cold at from 12 to 14 cents a kilo.

The meat juices and fats recovered during the process are collected separately, and the juice is sold at 2 cents a liter, the fat at the current price of suet. In this establishment the returns from all sales are made over to the owner after all expenses have been paid. The town receives $2 for each sterilization, plus the income from a tax of 40 cents on each ox handled in the slaughterhouse. In a 10-year period the sum of 14,860 francs was turned over to the owners of the cattle, while the town received 2,100 francs, being an average of 85 francs to the proprietor and of 12 francs to the township for each animal.

After the practice had been in vogue for some years in Troyes the routine recovery of condemned meat was given up because of the persistent protests of the butchers. In the same way the complaints from wholesale establishments have greatly interfered with the sterilization of condemned meat in Paris. In Versailles the practice was abandoned in October, 1916, owing to the prejudice excited by rumors set afloat regarding the safety of the procedure. Nevertheless, large quantities of meat of an inferior quality, or actually condemned after veterinary inspection, was obtained from army purveyors and contractors and turned over to various charitable agencies to be used for the relief of the poor.

Even where the consumption of tuberculous meat is objected to (on the grounds of pecuniary loss and not on the grounds of health), there are other types of condemned meat available for use, but the problem has been complicated by the great increase in the commercial value of fats for industrial and manufacturing purposes. The sanitary veterinary service of the Department of the Seine has been making earnest appeals to butchers and wholesale dealers with a view to resuming and increasing the sterilization of meat capable of being rendered edible and of being put on the market at prices adapted to the means of the needy.

DE FILIPPI, F. **Special problems of the Italian medical war services.** Proc. Roy. Soc. Med., London, February, 1918.

The author begins with a discussion of the Italian ration, quoting from Belli (see U. S. Naval Medical Bulletin, October, 1917) and the statistics of injury and mortality in the Italian campaign, quoting Balestra (see U. S. Naval Medical Bulletin, January, 1918).

One of the early tasks which confronted the Italian sanitary officials was the control of a virulent epidemic of cholera which developed in August, 1915, when the Italians captured and occupied Austrian trenches infected with cholera. The problem had three phases: (1) To localize the outbreak and prevent its distribution to the whole army; (2) to isolate and cure the patients; (3) to prevent the spread of cholera throughout Italy.

These features of the problem were brilliantly solved. The disinfection of the first-line trenches was accomplished under fire by medical officers and specially trained men of the newly created prophylactic section. Infected men were removed. Feces collected from each individual in the inspected area were sent for bacteriological examination to the advanced field laboratories so as to isolate carriers. Isolation of carriers was everywhere always followed by reduction in the number of cases. Earth trenches were treated with lime. Those lined with cement were sprayed with carbolic acid or lime water or with acid sublimate, 3 to 5 parts per 1,000.

"The isolation and cure of the patients, the isolation and bacteriological examination of suspected cases, the quarantine and examination of every man belonging to an army unit in which cases of cholera have occurred, and the establishment of a protective zone to prevent the spread of the epidemic into the country at large are all parts of the prophylactic organization which has been strictly applied to all the troops operating at the eastern and northeastern front, to the workmen and also to the civil population of the districts where these troops are quartered.

"The men sent back from an infected area fall naturally under three categories: Those actually suffering from cholera, those sick from other causes or wounded, and those in a normal condition. The first are sent straight to the advanced isolation hospitals, whence, after being clinically cured and recognized as free of bacteria, they pass into convalescent hospitals. Those suffering from noncontagious diseases have to spend six days in special quarantine hospitals, while their freedom from the germ is ascertained. Finally, the men in normal health returning from the front are obliged to pass through an observation station where they are bacteriologically examined and where their clothes and every object they carry are sterilized, while the men themselves are cleaned and freed from parasites.

"The interior of Italy is protected from contagion by an advanced quarantine zone and a second wider zone stretching along the foot of the Alps as far as Milan, and from Milan skirting the Apennines along the Via Emilia to the Adriatic. No person can pass out of the quarantine zones until two separate examinations have been made, proving him to be germ free.

"The movements of the civil population in the Isonzo districts occupied by our army were subjected to the same restrictions as were applied to the troops. These measures were supplemented by a strict surveillance of the drinking water, food, and hygienic conditions of the houses, barracks, etc. The supply of drinking water has required a special organization. Owing to the scarcity of springs on the tablelands to the north of Vicenza, by the Isonzo, and on the Carso, it became necessary to organize the transport of water by lorries or by pumps and water pipes and by the building of reservoirs, etc. The troops on the Asiago tableland alone required 100,000 gallons of water per day.

"It goes without saying that cholera vaccination is universally practiced side by side with the typhoid and paratyphoid vaccination. The compulsory vaccinations in the army are performed in the following order:

"(1) Smallpox vaccination.

"(2) Anticholera vaccination. This is performed 10 days after the smallpox vaccination, and is given in two doses at five days' distance from each other. The first dose is 1 c. c., and the second 2 c. c. The reaction is generally very slight. The cholera vaccination is repeated twice a year—in the spring and in the autumn. The strength of the vaccine has been gradually increased from 1,000 million to 3,000 million germs per cubic centimeter.

"(3.) Typhoid-paratyphoid vaccination. This is made with mixed vaccine and is given in three doses at intervals of 8 to 10 days, beginning 7 days after the second anticholera vaccination. The first dose is ½ c. c., the second 1 c. c., and the third 1½ c. c. The typhoid-paratyphoid vaccination is practiced once a year, between December and March. The mixed vaccine is prepared on the basis of 800 million of typhoid bacilli and 400 million of paratyphoid bacilli per cubic centimeter.

"The prophylactic organization has never interfered with the military operations, and it has been completely successful. It has even been possible to send the whole of the troops operating in the front line on winter leave for a fortnight, without any danger to the country from contagion. Not one case of cholera has appeared in the interior of Italy.

"In 1915, in a few months' time, we had to deal with over 14,000 cases in the Army. In the following year the cases amounted to only

170, due to small outbreaks in two units, which were at once arrested. This sanitary organization has been so successful that it has gradually been extended from the Isonzo to the other territories of war, giving us complete security against any sudden outbreak of contagious disease.

"Venereal diseases in the Navy have been brought down to less than half of their former number, which was 136 cases per year per 1,000 sailors. In a few ships where the measures were applied more vigorously the infection disappeared altogether for long periods at a time."

PATHOLOGY, BACTERIOLOGY AND ANIMAL PARASITOLOGY.

HENRY, H. **Investigation of cultural reactions of anaërobes found in wounds.** Jour. Path. Bacteriol., July, 1917.

The report comprises: (1) The isolation of anaërobes in pure culture. (2) The morphology and cultural features of the more important anaërobes found in wounds. (3) The differentiation of anaërobes by means of sugar reactions. (4) The changes produced by anaërobes in the tissues. Only portions of the first two sections are considered in this abstract.

The three anaërobic organisms most frequently found in war wounds and heart blood post mortem examinations are *B. Welchii*, 52 per cent; *B. sporogenes*, 32 per cent, often confused with *B. oedematis maligni; B. tertius*, 8 per cent (*B. Fleming*).

The methods of isolating pure cultures of the organisms depend upon their cultural characteristics and spore production. The *B. Welchii* is saccharolytic, producing stormy fermentation on milk. It grows with great rapidity on alkaline meat media. When transferred twice daily for a few days and plated a pure culture can be obtained. *B. sporogenes* is proteolytic, grows very slowly and produces spores. After four or five days' growth on litmus milk it may be separated from *B. Welchii* by heating to 80 C. for 20 minutes. It survives that temperature because of its spores. Subcultures in alkaline meat media cause a foul odor and the production of a black pigment. Direct plating from exudate of wounds on agar will at times permit separation of *B. Welchii* and *B. sporogenes*. *B. tertius* is saccharolytic, but grows more slowly than *B. Welchii*. It forms spores. It may be obtained in pure cultures by growing on milk for five days, heating at 80 C. for 20 minutes, planting on alkaline meat media for two days, and then planting on agar for two days; repeating the planting on alkaline meat media and on agar plates until pure cultures are obtained. If after two days fermentation begins on meat media it points to the presence of *B. tertius*. All the culturing was done anaërobically.

The formula for alkaline meat media is as follows: To 8 ounces of bullock's heart freed from fat and finely minced add the same amount of tap water and cook slowly. Add normal caustic-soda solution until the mixture is alkaline to litmus. Tube out the mixture, cover with paraffin and autoclave.

[G. F. C.]

EYE, EAR, NOSE, AND THROAT.

KEIPER, G. F. **Pretended blindness and deafness and their detection.** Jour. Indiana Med. Assn., Vol. X, No. 11.

While the following tests are considered from the Army standpoint, they are of sufficient importance to be given in their entirety.

THE EXAMINATION OF THE EYES.

The conscript is seated 20 feet from the Snellen test card. One eye is covered with a card—not the hand. He is asked to read the letters from the top of the card down as far as he can, and the result obtained is recorded on the blank in the form of a fraction. The numerator is always 20, the distance in feet from the test card to the one under examination. The denominator is determined by the size of the last letter read—i, e., 20/30, 20/40, or 20/50, as the case may be. While 90 per cent respond readily, it is interesting to note the hesitancy of the malingerer, and how easy it is to make him see letters in the line below the last one that he says he can read plainly. I use a chart which at the side has the lines numbered with figures of the size of the 50-foot line. He may begin to read 200-foot line and repeat the figure or ask if he shall repeat the figures. That already determines that his vision is 20/50ths. He may stop at the 50-foot line, but urging him on because he saw the other figures so well, we persuade him to read the next line, which, as it were, pushes him into the service unconsciously, or, if he discovers his fatal error, it is too late; or the same result may be obtained by the shifting of weak lenses before the eye. Usually they do not discover the error committed. Then the other eye is similarly tested.

If in spite of these ruses the vision remains reduced below the above standards, we must test each eye at 10 feet first and then at 40 feet. If the conscript has a real defect the fractions obtained will be constant; if a malingerer, the fractions will not be constant, as a rule.

By using the illiterate test type with a mirror so placed that when he is turned around to read the test type in the mirror instead of direct, as he did, the apparent distance is trebled, we have another way of detection of which the examinee is unaware. Moreover, if the vision is below standard, we must examine the conjunctiva for trachoma, the lids for ptosis, blepharitis, ectropion, and entropion;

the lacrimal apparatus for epiphora; the eyeballs for exophthalmos, strabismus, nystagmus, and asthenopia.

Artificially produced conjunctivitis is to be looked for, for abroad we read of ipecac powder put into the conjunctival sac to produce conjunctivitis. In this country similar effects have been produced by silver nitrate, copper sulphate, and pepper. Atropia has been used as mentioned previously. Oblique focal illumination will reveal the condition of the cornea. The ophthalmoscope also must be used to determine if organic lesions exist in the fundi.

Suppose the conscript feigns total blindness in one eye. We have two valuable objective tests—the position of the visual axes and the pupillary reaction. If one eye turns outward and upward, it is pretty good evidence that the eye is amblyopic, and vice versa. The pupillary reaction depends on the fact that in the dark the pupil dilates, while in the bright light it contracts. The reflex arc is the optic nerve for the afferent nerve, and the third nerve for the efferent nerve. The examinee is placed before a well-lighted window and the examiner covers both eyes with his hands, cautioning the examinee to look into the distance, and after a few seconds removes them to observe the pupillary reaction. If the pupils promptly contract there is sight present. Then the alleged blind eye is uncovered while the good eye is covered. If the pupil promptly contracts there is sight, and the more prompt the reaction the better the vision. Of course, there will be no reaction if synechiæ are present. The same is true of paralytic mydriasis.

The consensual reaction is also to be noted—i. e., the behavior of the other pupil when one only is uncovered, the other remaining covered, for with vision in one eye uncovered reacting to the light there should be a similar reaction in the uncovered eye. In every instance avoid touching the patient's face.

The ability of the patient to converge is also to be noted, as well as his power of accommodation. The behavior of the eye under a prism of 6° placed base out is interesting; to secure binocular vision the eye will turn in, and vice versa.

There are a large number of subjective tests used to detect malingering, and it behooves the examiner to be acquainted with all of them in order not to run the same test for all, as shrewd malingerers are liable to trade information and thus enable subsequent ones to malinger successfully, or to make them the harder to detect. In all these tests the examiner must sit directly in front of the examinee or on the side of the alleged blind eye, and keep the gaze on it at all times, for the malingerer may attempt to close the alleged blind eye and thus defeat the test for malingering. On several occasions I detected that trick and used the incident to browbeat the examinee into confession of trickery and to secure eyesight in an eye claimed to be blind.

The principal tests are as follows:

Duane's test: Place on a white piece of paper some letters alternatively in red and black. Place over the good eye a piece of red glass and ask the examinee to read. If he reads all, he sees with the alleged blind eye. For if he were really blind in the other eye, he would read only the black letters.

Snellen's test: In a frame is placed alternately red and green glass of such density that when one piece of it is placed over the other no light is transmitted. On these pieces are blocked off the well-known Snellen letters for distance vision and as on the test card. Before the examinee's eyes is put a pair of specs, in one cell of which is a piece of red glass and in the other a piece of green glass, and he is asked to read the letters from left to right. If he reads all, he is not blind at all. His acuity of vision is also determined. This frame must be exposed only in testing the vision. If he is really blind in one eye, he will see only the letters of one color.

Cuignet's test: Cause the examinee to read aloud some matter as in a newspaper, and while thus engaged place a lead pencil between the paper and the examinee, holding the pencil vertically. If he reads unhesitatingly he is not blind in one eye. If he has a blind eye, he will have trouble reading consecutively. A modification of this test is the Javal-Cuignet shoebox test.

Cuignet's test with a lighted candle: Hold a lighted candle in front of the examinee's good eye and slowly move it across the face in front of the alleged blind eye. If he says he still sees it he lies, for the nose would prevent him seeing it, provided the alleged blind eye were really so.

Graefe-Baudry test: Take precaution that you are concerned with the good eye only, slyly covering the alleged blind eye with your hand. Place over the good eye a prism of 18 prism diopters, base up, in such a position that monocular diplopia is produced, and which the examinee acknowledges. Now slowly slide the base up until it has crossed the pupil, in the meantime uncovering the alleged blind eye. If the examinee says he sees two lights ahead, he lies as to the condition of his alleged blind eye.

Duane's test for close vision: Have the examinee read out aloud fairly rapidly, and when thus engaged slip a prism of four prism diopters base up before the alleged blind eye. If he reads with confusion and hesitates, he sees with the alleged blind eye.

Rendering the examinee artificially myopic: Place before the good eye a six diopter lens. Print can only be read with that eye at 17 centimeters. At this distance hold some test type and ask him to read; while doing so, slowly withdraw the printed matter. If he still reads, he reads with the alleged blind eye. Harlan's test is but a modification of this, for he uses a 20 diopter lens, convex or concave, before the good eye.

Jackson's test: Place before the good eye two strong cylindrical lenses, one convex and the other concave, so that they neutralize each other. Have the examinee read, and while thus engaged turn the cylinders so that they are crossed. If he still reads, he reads with the alleged blind eye.

Todd's test: Place before the good eye a black disk with a pinhole in the center. The examinee is asked to read aloud the test letters of Snellen across the room. While reading thus, the examiner gradually tilts the head upward until the line of vision is thrown below the hole in the disk, and the letters are no longer visible with that eye. If he still reads the letters, he reads with the alleged blind eye.

Todd's test with the Worth amblyoscope: The amblyoscope is set so that the objects placed in the distal ends of the tubes appear crossed, as the bird and cage. It is then locked in this position and carelessly laid on the table of the examiner. The instrument is placed before the eyes of the examinee and he is asked what he sees. Suppose the right eye is the alleged blind eye, and with the left eye he sees the cage that is in the right tube—he lies and the truth is not in him.

The 6 or 8 diopter cylinder: Make some vertical lines on a piece of paper; place before the good eye a 6-diopter cylinder axis vertical, and hold the lines 3 feet from the examinee's eyes and ask him to count the lines. If he succeeds, he sees with the alleged blind eye.

The double prism: Place before the good eye a double prism, horizontally. If he says that he sees three lights ahead while looking at a candle, he sees with the alleged blind eye. If he says he can not see the two lights, he lies.

Fridenburg's test: The principle of the apparatus is to reflect into a mirror into which the examinee looks, test type of the illiterate, these being placed on each side of the patient's face in the frame's racks. The mirror is placed before one eye, and, being pivoted, can be revolved or tilted so that he can not tell which eye is being tested. The mirror can then be swung before the other eye.

Hartman's diaphragm test: While this instrument was not invented for this purpose, it is valuable, nevertheless, for the detection of malingering. It is the reverse of the bar-reading test. Instead of of the bar, the examinee negotiates a screen in which there is a hole. Through this he looks at the test card naturally, not suspecting the test of vision to which he is being subjected. If he is able to read all the letters, he sees with both eyes.

Priestly Smith and Edward Jackson test: Place before the alleged blind eye a 6° prism, base out, while the examinee is fixing his vision on a light ahead. To secure binocular vision the eye will turn in if it is a seeing eye. It will turn out again when the prism is removed.

Jackson's test: Place before the good eye a prism of six prism diopters, base out. The eye will move in and the blind eye will move in the same direction and to the same extent. If binocular vision exists, the other eye will not move at all.

Berthold's test: Take a prism of 20 prism diopters and hold it before the alleged blind eye while the examinee is reading aloud small printed matter. If good vision exists in the eye, it will be very difficult to do this.

Nettleship's test: Place in the good eye of the examinee a drop of 1 per cent solution of atropia sulphate and bandage the eyes for one hour, after which place in his hands some small printed matter and, removing the bandage, ask him to read. If he succeeds, he reads with the alleged blind eye.

PRETENDED TOTAL BLINDNESS.

Schmidt-Rimpler test: Ask the examinee to put his hand before his face and to look at it. The really blind, knowing its position in space, readily does it and without hesitation. The malingerer will hesitate and look in a different direction for it.

Van Welz's test: In a darkened room place a candle in front of the examinee in such a way that he will naturally look in its direction. Place a prism, base out, before one eye. If vision exists, the eye will turn in, and vice versa.

The examiner may go to one side of the room, interposing a barrier as he goes. Then ask the examinee to approach him. If he avoids the barrier, he sees it. Care must be taken to avoid accidents with the really blind.

In a hospital, under close scrutiny, bandage both eyes. If he sees, he will reveal his true state very soon, as it is very irksome to be blindfolded very long thus.

The reaction of the pupils is to be observed as before noted. It may give us a clue to the quantity of vision present.

The really totally blind have a peculiar gate, the expressionless face, the upturned eyes.

THE EAR TESTS.

It is expected that the ordinary conversational voice will be used in making these tests that determine a recruit's fitness for service. It ought to be heard at a distance of 20 feet. The record is in the form of a fraction. Its denominator is always 20. The numerator is the distance at which the voice is heard. One ear at a time is tested, the other being tightly closed by pressing the tragus into the external auditory canal with the index finger. The examinee stands with the open ear toward the surgeon. He is commanded to close his eyes. The test is begun a short distance from him and he is asked to repeat whatever is said to him. We usually use numbers. He may hear

perfectly up to, say, 12 feet and refuse to hear anything more. Now step quietly back to the full 20 feet and ask in a low voice, "Can you hear me now?" Very many respond: "No, I can not hear you, Doctor." Of course we say to the clerk: "Mark him normal," for he has malingered.

At one place in our State the examiner lined up a number and stepping the full 20 feet asked all who could not hear him to step out of line. Four did so, exposing themselves to the charge of malingering. In an adjoining county the examiner was much perplexed by one attempting to deceive him and happened to remember that he owed the examinee a $5 bill. Stepping back the full 20 feet, said in a voice just above a whisper, "Come around to-night and I will give you that five I have owed you for some time." To his uttermost surprise, he responded: "All right, I'll be there." Such devices while not strictly scientific are otherwise to be commended because they save a lot of valuable time.

The tests usually used are as follows:

The Weber test: If a tuning fork in vibration is placed on the vertex of the examinee it will be heard best in the deaf ear. The malingerer will claim that he hears it best in the good ear. Now stop the good ear with the finger and he will say that he does not hear it at all. Of course he lies, for he should now hear it best in the otherwise good ear.

Kerrison test: In a patient who claimed to be deaf in one ear by injury the drumhead appeared normal. He assumed a degree of deafness which could only have come from injury to the labyrinth. The caloric test was applied to the alleged deaf ear and the result was positive. The response was quick and normal in every respect, and in the confusion ensuing on the vertigo it was very evident that the unilateral deafness was assumed.

The noise apparatus of Bárány: This is one of the best of the recent tests. It is applied as follows: The examinee is asked to read aloud. While thus engaged the noise apparatus is placed in the good ear and the noise started. If the examinee is really deaf, he will raise his voice and sometimes these subjects will fairly shout in order to hear themselves read. If the voice is not raised there is no deafness in the alleged deaf ear.

The confusion test: Take two rubber tubes and on one end of each place a funnel; the free ends are inserted into each ear, one in each; have two persons read aloud one into each funnel, but read dissimilarly, and ask the examinee to repeat what he hears. If hearing exists in both ears this is very difficult.

Chimani's observations: He recommends repeated tests with the acoumeter and metronome. If slight differences exist in the different examinations, the person is probably telling the truth. Wide variations indicate malingering.

Erhard's test: This is based on the fact that the normal ear even when tightly closed will hear the tick of a loud watch. The alleged deaf ear is closed. The loud ticking watch is approached to a distance of 3 meters. The examinee counts the ticks. The normal ear is now closed and the deaf ear is examined at a meter distance. If he says he can not hear the watch he is malingering.

Wagner's test: This is the most recent test, and comes from Chicago. The sound of a tuning fork is received in a funnel from which runs a tube to a bifurcation and from the latter run two tubes on the ends of which are funnels meant to cover the ears of the examinee. The total length of the apparatus is 6 to 7 feet. To conduct the test, both ears are covered with the funnels and the examiner and his assistant stand behind the examinee; each have in their hands tuning forks of the same pitch (C2). Both are sounded at the same time and one is placed on his vertex, while the other is placed in the funnel. Sound is thus transmitted both by air and bone conduction. Repeat two or three times. Then the examiner places his tuning fork, which is now still on the vertex of the examinee, while at the same time the assistant places the sounding tuning fork within the funnel. The tube leading to the good ear is pinched shut and if the examinee says he hears the tuning fork still he is a liar.

With these tests the surgeon will be able to easily detect the malingerer in the very large majority of cases. There are a few who will for a time baffle the surgeon. They will require frequent observations before the truth is arrived at, but it will ultimately come to light.

(G. B. T.)

FRASER, J. S., and FRASER, J. **The morbid anatomy of war injuries of the ear.** Jour. Laryngol., Rhinol., and Otol., Vol. XXXII, No. 11.

Ear injuries in war are classified according to the morbid anatomy as:

(1) Direct injuries, due to bullets or high explosives; (2) indirect injuries, due to blows or falls on the head, and may be either with fracture of the labyrinth capsule, or without; (3) noise deafness, due to prolonged or intense gunfire; (4) "shell" or "explosion" deafness (labyrinth concussion).

1. In direct injuries, fracture of mastoid, involvement of middle and inner ears, and in fatal cases extreme comminution may be present. Radiographs are of use in estimating extent of injury.

2. Indirect injuries, due to fracture of base of the skull, same as in civil life.

3. Noise deafness. It has been shown that air conduction of sound is of paramount importance in the production of noise deafness. Tissue and bone conduction are of little importance. The hair cells of Corti's organ are first affected, later the supporting cells and,

secondarily, the ganglion cells and nerve fibers; the part of Corti's organ affected depends upon the pitch of the sound—high pitch affecting the neuroepithelium at the base of the cochlea; medium pitch, Corti's organ in the middle coil; low pitch, Corti's organ nearer the apex (confirming Helmholtz's theory).

4. In "shell" or "explosion" deafness, there is a blow from the condensation of air, so that in many cases there is an injury of the drum membrane accompanied by hemorrhages.

With rupture of the drum, it is stated, there is less likelihood of damage to the labyrinth.

Hemorrhages may occur in the peri or endo lymphatic spaces of the inner ear, although it would appear that these structures are well protected. There may occur hemorrhages in the internal auditory meatus.

In addition to the above-mentioned lesions, theories have been advanced, first, that the explosion and loud noises may destroy the delicate nerve endings in the cochlea, and cause paralysis.

This may occur somewhat the same way as the "eclipse" blindness. Another theory places the seat of the damage in the brain, multiple small hemorrhages, in the pons, medulla, and cerrebellum; involving the central connections of the auditory and vestibular nerves.

Milligan and Westmacott have suggested that shell deafness is due to a temporary interference with the neuron connections in the higher brain centers, and not to an organic lesion.

Several cases with pathological findings were reported, illustrating salient points.

(G. B. T.)

BRYANT, W. S. **Prevalence of ear injuries and diseases in the French Army.** Jour Laryngol. Rhinol. and Otol., Vol. XXXII, No. 11.

The ear patients in the author's service amounted to about the same number as the eye patients in his service, and in the Zone des Armeés at the front ran 16 per cent of ear patients, while from the evacuation hospitals 4½ per cent of ear cases are evacuated to the rear. In the (Zone des Étapes) ear cases were 6¼ of the total sick, and in the interior region 9 per cent were ear cases, and of these the author estimated 80 per cent will show considerable impairment of function.

Injuries and their complications are classed thus:

1. Rupture of tympanic membrane.
2. Complications of ruptured tympana.

(*a*) Suppuration of middle ears, acute and chronic.

(*b*) Mastoiditis, mastoid abscess and its complications.

3. Commotion of the eighth cranial nerve apparatus (cochlear branches always suffer; the vestibular less frequently).

(*a*) Sudden onset.

(*b*) Gradual onset.

Susceptibility to damage is increased by nasal and tubal obstruction, presence of existing ear disease, or disturbances of nutrition.

Treatment of a ruptured membrani tympana consists in dry, aseptic treatment, removal of moisture by wiping, insufflation of sterile boric acid powder, and plugging of the meatus with sterile absorbent cotton.

The author believes the actual total of ear cases to be twice the statistical figures.

(G. B.

STEINBUGLER, W. C. **Dental infection in eye diseases.** Arch. Ophth., Vol. XLVII, No. 2.

The exciting organism of ocular infections, due to oral sepsis, may be any one of a number of bacteria, but the streptococci, especially the viridans, staphylococci, and pneumococci, are probably most frequently involved. The selective tissues of the mouth organisms have been the joints, endocardium, and the eye. The exact method of eye infection from a dental focus is yet undetermined; it may be through channels in the bone, subperiosteal tissue, or lymphatics. A direct extension through the venous channels from the diseased area to the cavernous sinus is anatomically possible. No definite clinical picture can be described, but the iris, ciliary body, and choroid are most frequently involved.

A very thorough investigation along these lines has been carried out by the dental department of the Herman Knapp Memorial Hospital, where in all 53 cases were examined. The routine examination where the infections were excluded was to have the teeth X-rayed, the streptococcus complement fixation test being performed on the blood. The teeth were treated and, if necessary, extracted. A vaccine was prepared from the culture obtained at the time of extraction.

In summarizing the result of investigation the following conclusions were reached:

(1) Dental infection does nor present a definite clinical entity, although most frequently seen as a low-grade chronic infection of the iris, choroid, and ciliary body.

(2) Dental infection is more frequent than has been believed and must be carefully sought for by means of the X-ray.

(3) The infection is carried to the eye, in all probability, through the lymphatics and osseous channels.

(4) The streptococcus viridans is the organism most frequently found in cultures from the tooth sockets, and it is the chief bacteriological factor. Other organisms to be considered are the staphylococcus, pneumococcus, and bacillus pyocyaneus.

(5) The streptococcus fixation tests have not given satisfactory results, and vaccine treatment has been disappointing. The factors most concerned in the cure and improvement of these cases were the extraction of the offending teeth.

(G. B. T.)

MILITARY, LEGAL AND INDUSTRIAL.

ANDERSON, H. G. **Selection of candidates for the air service.** Lancet, London, Vol. 1, No. 11.

In a very careful and thorough review of the present status of aviation, in the discussion of the special-sense examination the author believes that the aviator should have unaided normal vision in each eye separately, and normal color perception. In his experience, which includes much actual flying, the vision had more to do with determination of position in space than any other sense. Those with defective vision are at a great *disadvantage* in an aerial flight on making landing. The presence of heterophoria, or latent squint, has also been found a cause for making bad landings. Concealed hypermetropia should cause rejection if sufficient to enable a candidate to read 6/9 each eye, with a plus 2 lens. *The importance of perfect color perception is very great.* Its use comes in picking out the color or markings of hostile machines, in recognizing signal lights, and in judging the nature of landing grounds. Night blindness is important in selecting pilots for night bombing. Night blindness is tested by reading ordinary test cards under increased or decreased illumination.

Under the aural examination is included examination of the nose, throat and ear, and also of the teeth and gums, since most aviators fly with the mouth slightly open, and any minor degree of oral sepsis is aggravated by the rush of cold air. Septic tonsils should be enucleated. The nose should be examined to estimate the amount of clear air-way. The Italians lay stress on this examination, and even take tracings of the degree of nasal stenosis. Cases with adenoids, nasal polypi, or infected sinuses are rejected temporarily.

Hearing must be normal, and each ear is tested separately by whisper at a distance of 20 feet. Use is made of the terms employed in aviation, such as "contact" and "switch off." Defective hearing in the pilot or air mechanic may lead to serious injury or even death to the latter in starting the engine. In this the mechanic swings the propeller, and should the aviator through defective hearing fail to catch the words "contact" or "switch off," the propeller may back fire and cause serious injury to the mechanic. Chronic suppurative middle-ear disease is cause for rejection. Cases showing perforation of the drum, or scars, should be rejected. They would probably suffer from pain in the ears, induced by the constant noise and from pressure effects in changing height rapidly.

EQUILIBRIUM AND MUSCLE SENSE.

It has been found in a fog that it is almost impossible to detect any deviations of position during a flight. Aviators have come out of dark clouds or fogs and found themselves flying one wing down, or even upside down, without knowing it. Therefore most of the impressions which control balance in flying come from the eyes. To investigate this the author, his sense of balance and vestibular reactions being found normal, carried out the following experiment: Blindfolded and with ears plugged, he sat in the stern seat of an aeroplane in telephonic communication with the pilot in front. The author attempted to describe the evolutions carried out and his position in space during the flight. At first he was able to do this fairly accurately, but after a time was completely confused and thought the machine was flying up and up continuously, while in reality it was spiraling down to the left. Nevertheless, he advises a thorough investigation into the candidate's equilibrium, muscle sense, and vestibular reaction. In addition to those tests, the psychomotive reactions should be thoroughly gone into, and the aviator should possess a normal reaction time with regard to vision, hearing, and touch.

(G. B. T.)

STONE, ESTHER H. **Plea for early commitment to correctional institutions of delinquent children, etc.** Institution Quarterly, Springfield, Ill., March, 1918.

In a very interesting paper read before the Illinois State Hospitals Medical Association the author reviews the present status of public opinion relative to the punishment of habitual offenders and refers to the mental attitude which furnishes criticism but no practical remedy for the difficulties connected with the proper handling of juvenile delinquents. Reviewing the admissions and readmissions for two years ending March, 1916, at the Illinois State Training School for Girls, Geneva, Ill., the writer paints the relationship between criminal inclination and mental deficiency and shows how inadequate are all repressive or educational measures unless adopted so early in life that the criminal inclination has not become confirmed and ingrained habit. The lack of response to precept or example, the superficiality of character, the incapacity for sustained effort or earnest purpose found in girls of an average age of 16 in this institution is proved by the definite cases cited.

In conclusion, Dr. Stone says:

Social workers and courts become active when it is much too late.

Boards of education and public-school systems must provide, as a part of the regular staff, for a trained psychologist, to operate in every school, and to be in constant touch with the pupils and the teachers from the lowest grade up. Immediately after it is noticed that a child appears to be backward in his work, or evinces any mental peculiarity, or is criminally or immorally inclined, the psychologist should be consulted, and a thorough study made of the case.

It is possible to determine whether or not the child is likely to outgrow its handicap, or whether that handicap will develop into something more serious. If the latter is the case, the child must be at once transferred to a special school for its training. This should not be the result of court action, nor should the consent of the parents be necessary; it should be a very simple process of passing from one grade to another. It should be understood and accepted as the natural course of procedure, without attaching to it any unusual publicity.

The school for the psycopath should be a permanent home or boarding school, under municipal supervision. There, amongst his own kind, and away from others whom he might influence to evil, he should be studied constantly; as much education as it is possible for him to retain should be furnished him, but primarily he should be taught some useful work for which he is best suited, and by which he is likely to become self-supporting. With this class book learning is secondary; ability to financially care for himself is most important.

Provision should be made to retain the person until he is at least 25 years old, at which time it is possible to decide with considerable accuracy whether or not he is a fit subject to mingle, unsupervised, with the rest of society. If he is, he should be permitted to leave the care of the State; if not, he should be sent to a community of his kind, where his special working ability is required. There should be segregation of the sexes in both the school and colony, and by no means should marriage or sexual relations be permitted.

The only solution to the problem is to cull out the defective from the rest of society at a very early age, remove him from the normal child, prohibit procreation by segregation, and give him the special training that he requires. In this way will defectives eventually be eliminated, to a great extent, from the general population.

Hutt, C. W. **The future of the disabled soldier.** William Wood & Co., New York, 1917.

From the beginning of war to December 31, 1916, there were discharged from the army and navy of Great Britain 270,275 men, owing to disability, by which some are permanently and completely incapacitated for work and others able to work without assistance. The naval and military authorities are responsible up to the time the men are discharged as unfit because it is realized that they will be of no more use in the service. It has been suggested that the State should do something for (1) those requiring prolonged aftertreatment in order to become fit to earn a wage; (2) those disabled by tuberculosis; (3) those affected mentally; (4) the totally blind; (5) the deaf; (6) the paralyzed; (7) those who have suffered loss of limbs.

History.—Hans Knudsen in 1872 founded an institution in Copenhagen to care for and train cripples. In a period of 25 years 255 children and 175 adults were trained there, and 5,800 were cared for and given surgical appliances. In Petrograd in 1897 a workshop was organized for the orthopedic department of the Maximilian Hospital, partly to provide artificial limbs more cheaply, and partly to give a trade to cripples. During a course of 12 years 703 cripples were taught in the shop and 174 were taught to earn as good wages as the regular makers of artificial limbs. In France in 1899 the departmental shops of the Seine were founded by Mr. Marsoulan to deal

with crippled or invalid workmen. Many of these men are past the capacity for work and can not earn an independent livelihood. Their pay is in excess of their real earning capacity. The institution of the Frères de St. Jean de Dieu of Paris discharges each year 40 young men of 20 years of age perfectly able to earn their own living at bookbinding, tailoring, and bootmaking. However, their training covers years. They are taken in for rather trifling defects (less than the loss of a limb), to which, of course, they have been accommodating themselves since infancy. In 1908 at Charleroi a school shop was founded in connection with the large provincial technical school to train and employ cripples, more particularly men injured by accidents in factories. Classes were provided for clerical work, including typewriting, shorthand and designing, tailoring, harness work and saddlery, bootmaking and bookbinding. A pupil of this institution who had lost both hands was trained to make brushes almost as well as a workman with both hands. "The stump of his right forearm was fitted with a laced leather bucket, stiffened with a metal framework; to the stump was fixed the head of a hammer, the forearm acting as the handle. With a magnet, the man picked up a nail, held it in the proper position and them knocked it in with the hammer; all this was done quickly, easily, and in a natural manner."

Similar establishments were subsequently opened at Tournai and Brussels. Hence the Belgian Government had experimental knowledge of the problem of handling disabled men, and made suitable provision for them within a few months of the beginning of the war in a large school at Rouen. In December, 1914, a home for discharged soldiers was instituted at Havre. This has gradually become a school for vocational reeducation. Later, in December, an Anglo-Belgian hospital was opened for 50 convalescents in two military barracks, which has grown to 250 beds, with dependent establishments accommodating 700 more men. The above provision having become inadequate, the Belgian Military Institute of Professional Reeducation was founded near Vernon in August, 1915. This institution is not only self-supporting but has long since paid back to the Belgian Government the entire capital cost of installation. "The land provided was part of a forest; a sawmill was erected, the trees scientifically thinned out, the timber not used for building the huts was sold. The smaller wood was made into pickets and stakes for the use of the Belgian Army. The cost of the buildings 450,000 francs (£18,000) was repaid out of the profits on the lumber; the cost of the equipment and plant for workshops (£12,000) has been repaid out of the profits of the different workshops, which have sold their output at a cheap rate to the Belgian War Office thus affecting a double economy to the Government. A large farm forms part of the

establishment; on it horses wounded in the war are cared for and made useful again.

"There is at present accommodation for 800 patients; in addition, attached to the institute is a staff of 350 quasi-civilians unfit for military duty on account of age or on medical grounds; they serve as teachers, overseers, manual instructors, or as workmen.

"The fact that the entire population of Belgium is mobilized for military duty enables Capt. Haccour, the director of the technical work, to requisition the services of the very best craftsmen in the different trades for the teaching staff, who receive the ordinary pay of a soldier.

"The cost per day to the Belgian Government for each man is just over 2 francs; the feeding and clothing cost 1 franc, 54 centimes; the daily pay is 43 centimes; the cost of lighting and heating is 8 centimes per man per day.

"Forty-three different trades are taught, including almost every imaginable occupation. The workshops provide for instruction in bookkeeping, shorthand, typewriting, telegraphy, molding in clay, wood carving, drawing and designing of all descriptions, wall paper designing and painting, the manufacture of motor vehicles, and electrical machinery of all descriptions, tinsmithing and plumbing, tailoring, bootmaking, basketmaking, poultry farming, and rabbit farming, to which fur curing, dyeing, and trimming are added.

"The institute makes all the tools used by the workmen, besides a large number for the Army. All the printing and photographic work required is done on the premises, in addition to much work for the Government. The men are paid, in addition to their Army pay, from 5 to 20 centimes an hour, according to the work they do; the surplus profits are now being funded for the benefit of the men.

"The underlying principle of the whole establishment is constant work; no man is permitted to be idle. In part of the buildings is a small hospital for men who become ill or are temporarily suffering from their old wounds. Unless these men are absolutely helpless they are required to do some sort of work in bed, the hospital orderlies being efficient instructors of such work as net making or light basket-work.

"Men are only sent from the hospital at Rouen to Vernon when they are considered to have completed their actual hospital treatment. On arrival at Vernon the man is received by the officer in command and goes before a medical board, who determine the need for any further medical treatment.

"Port Villez affords opportunities for treatment similar to those of L'Hôpital Anglo-Belge, at Rouen. They make a certain number of orthopedic appliances, especially surgical boots. The men who have not yet finished their functional reeducation go through a course

of medical gymnastics; these are followed by school gymnastics, including athletics, throwing the disk and javelin, jeu de balle, jeu de paume, fencing, sword exercises, boxing, running and jumping, the underlying motive of the athletics being to reeducate the sound limbs and make them as effective as possible. The men are put through a graduated course in the use of their artificial legs. Successful efforts have been made to reeducate the hands and fingers of men who have been trephined. The injured limb can only be exercised by medical treatment for a very small part of the day, an hour at most; the manual work of the workshops fortunately provides an excellent means of continuing the movement of the disabled parts for several hours during the day.

"After the medical board, the head teacher sees the man to make arrangements for his general and theoretical instruction. To help him form an idea of the sort of work he would like to take up, he is taken round the workshops to see the different kinds of work and is given an opportunity of talking to the men and the instructors.

"Finally the man appears before a board presided over by the medical director, and comprising the head teacher, the technical director, and the doctor in charge of the *laboratoire de recherche sur le travail professionnel* to determine the occupation most suitable for him.

"The choice of an occupation is too difficult to leave entirely to the disabled man; he requires help to make a suitable choice. It is a momentous decision not to be lightly come to; on it depends in a considerable degree the man's happiness for the rest of his life. The medical examination card is carefully studied, the man is questioned, the extent of his general education ascertained, the degree of his intelligence gauged, special account is taken of his previous trade and social status. When advising the man the following are used as guiding principles:

"(1) He is advised to keep to his former trade if he earned a good enough wage and was satisfied with the work.

"(2) If the man must change his work, he is advised to take up work akin to his former work, unless prevented by his injury. A plumber, for instance, would be advised to take up tinsmithing.

"(3) If a man's output in a trade would be very considerably diminished by his injury, if he is sufficiently intelligent, he is selected for training in official, commercial, or teaching work, and is sent to the institution at Mortain *pour les blessés intellectuels*."

In 1914 the school at Charleroi was reproduced at Lyons. Later a professional school for the wounded was opened at Tourvielle. Here all the ordinary trades are taught, and, in addition, gardening, fruit growing, the raising of poultry, etc. Men for these institutions are selected from those having severe or incurable wounds inflicted during

action or on "any commanded duty," or suffering from severe and incurable infirmity due to military service. Rigid medical examinations are required for entrance, as the authorities do not desire the period of training to be interrupted by necessity for hospital treatment. A rigid investigation is made of the men's histories and characters and they are rejected unless they give promise of repaying the training. The majority of the men here—145 out of 200 pupils—had suffered the amputation of a limb. Money earned by the sale of articles is divided among the men who have reached the productive stage. Two-thirds of the proceeds go to the men who have been longest in the school, and only one-third to the newcomers, who are naturally less skillful. This system tends to reduce loafing in the shops, because the larger the output the greater the returns thus to be divided among all hands.

In April, 1915, a commission was formed, representing the ministries of war, marine, public instruction, commerce, agriculture, and the interior, which founded two schools for the reeducation of disabled soldiers—one at Paris, the other at Bordeaux, the former established in the Vacassy Institute under Dr. Bourrillon. From May, 1915, to December, 1916, 756 men were admitted for training at Vacassy. Of these, 591 completed their training, 315 secured places of employment, 36 returned to their relations, 32 left and can not be traced, and 208 were still undergoing training. Of the 165 who failed to complete their training, 12 were transferred to other centers, 16 returned to hospital, 99 left of their own accord within a month of admission, and 36 were dismissed for breaches of discipline.

Schools were founded at Montpellier and Bourges, subsidized by the territorial department. The former is one of the largest in France. It started in July, 1915, with 7 pupils, and by November, 1916, had received more than 450 disabled men, of whom 100 have left, after a complete course of reeducation, and are now earning a living by the exercise of a different trade from that which they pursued before the war. One of the features of this school is the perfecting of artificial limbs and appliances that will enable men who have lost limbs by amputation to undertake manual labor and thus prevent the congestion of occupations of the clerical type. Fifteen or sixteen different trades are taught here, and all the pupils receive a course of general instruction. Work begins at 7.30 a. m. and lasts till 5 p. m., with a break of two hours at noon. There are night classes in drawing for carpenters, mechanics, etc., and classes in anatomy and drawing for men making artificial appliances, etc. Reeducation of the left hand is a feature of this school. For three years this has been taught by Mr. Tamenne, a Belgian refugee who, having lost his right forearm when 16 years old, has taught himself to shave, to peel fruit, roll a cigarette, button a collar, tie a neck-

tie with his left hand, get on a bicycle, as well as a man with two hands can do. In addition, he has learned and is able to teach shorthand and typewriting with the left hand only.

One of the most important tasks of the authorities at the professional schools is to select the trades to be taught. Every effort is made to teach things that are really worth while, as, for example, the production of articles which bring a higher price when handmade. The competition of women after the war must be taken into account, and so the work must be as heavy as is compatible with the man's physical condition. While light sedentary work of clerical type can be taught to a large number of men in a short time, one teacher sufficing for many pupils, and there is no difficulty in finding candidates for the course, there is serious objection to encouraging this line of reeducation, as there will undoubtedly be great competition in this field by women widowed by the war or otherwise compelled to earn their own living. It is interesting to note with what foresight men from a locality having some special work have been incited to take this up. Thus in the Department of Ain, the making of combs and fancy articles in wood is a specialty, while in the vicinity of Lyons and in the vicinity of Bordeaux a special type of shoe or clog is worn, and so there is a demand for the production of these articles, while, naturally, in the vicinity of Thiers men having ability in the manufacture of cutlery will be able to find work.

Bootmaking, tailoring and tinsmithing have special value because they can be practiced successfully away from the large cities, and thus lessen the tendency of the rural population to flock thither Every effort is being made to encourage men to return to the land. The French Government is considering a plan by which soldiers may commute a part of their pension to agricultural holdings, but on account of reduction of winter work these men should all have some alternative indoor work.

The most difficult task is the training of men who have lost an upper extremity. They should be in workshops together for mutual encouragement and example and to permit an exact estimate and classification of their output.

From experience in training 700 men, Dr. Bourrillon estimates that the following length of courses is adequate:

	Months.
For clerical work	3
For draughtsmen (architectural and mechanical)	10–12
For leather worker	8
For bootmaker (for repair work)	6
For mechanic (to drive and repair agricultural motor tractors)	6
For tailor	8
For tinsmith:	
For an ordinary workshop	4
To work without supervision on his own account	8

Most professional schools give longer courses of training. At Montpellier, for instance, the courses are:

	Months.
Bootmakers	12-15
Tailors	12-15
Carpenters	15-18
Wood turners	8-12
Mechanics	15-18
Harness work and saddlery	11-15
Orthopedic work	15-11
Draughtsmen	8-12
Clerical work	8

At agricultural schools three months is deemed sufficient to learn basket making, fish rearing and milk testing, while six months are required for harness work, beekeeping, cow keeping. Twelve months are needed to train the agricultural machinist, the vine grower, horticulturist and cheese maker.

The best instructors are persons with physical defects similar to those of their pupils, but they require special instruction in the best methods of teaching. This point is emphasized at the school at Bordeaux.

The average daily cost of instruction, board, and lodging per man at a French provincial school is 5 francs. Funds are obtained from private sources, but in the main from a State grant of 3.50 francs per day per man.

The professional schools are far superior to ordinary workshops because there is less tendency to discouragement and less chagrin over initial failures; because there is a superior form of instruction, regular habits are inculcated, and a valuable rivalry springs up between the pupils. On the other hand, it must be admitted that with the present general lack of skilled labor and the demand even for unskilled men in the shops, that work in the latter almost insures the pupil's finding permanent employment there when he acquires a reasonable proficiency. On this account the local society at Orleans has arranged for all instruction to take place in the shops of private firms. At Agen a center for reeducation founded with the support of the local manufacturers all available resources are drawn upon. Thus at the Practical School of Agen there are available 80 places for those desiring to learn bookkeeping and clerical work, private workshops afford room for 400 apprentices, and, finally, there are a hundred places in workshops for men disabled but not requiring reeducation.

The ministry of artillery and munitions provides work for disabled men in the metal works controlled by it at Lyons, Toulouse, Marseille, and Bordeaux. To obtain work of this type a man must have a certificate from the officer in command of the military hospital as

to his general condition and fitness. He works for but half a day and is paid by the piece. The military governor of Paris has approved a similar scheme for men under hospital care.

"The general experience is that the men do not avail themselves to the extent that they should of the opportunities placed at their disposal for learning skilled trades. Of 2,000 men interviewed by Dr. Bourrillon only 350 were willing to be trained, 500 out 3,000 men interviewed by the authorities of the Federation Nationale."

Naturally enough some of the men apprehend that they will not be strong enough to go through with training and earn a living at a trade. This lack of confidence is often increased by the unwise sympathy of nurses and visitors and the public generally. Many consider that, having been wounded, they have a right to demand permanent assistance from the State, and hence do not need to learn a trade, or else they look forward to some soft Government job. In some cases the men are incorrigible and lazy. For all these reasons it is essential that training be begun early and while a man is still using only a temporary appliance. Occasional work in military orthopedic hospitals, such as wielding a broom, duster or a mop, is far superior to any technical exercise, because the man's mind "is set on the dirt he has got to remove, not on the fact that his maimed hand is repeatedly taking hold of and letting go the duster."

An atmosphere of work in a hospital is essential, because it will benefit the mental outlook of the patients. Spirit and initiative tend to depart when a man lies in bed week after week recovering from a septic wound. If there is nothing definite for him to do but play cards, smoke, and listen to concert or cinematograph, he acquires the habit of getting through a day doing nothing. The man must forget himself, forget he is maimed, and begin to think of himself as having a future, and the men who begin to work are the ones to have the privileges.

The men in hospitals who decline reeducation should not be discharged prematurely, as this might be an incentive to decline. They should be segregated, for even well-disciplined men would refuse training if they could thus get discharged and draw a pension the sooner. Many students and observers agree that reeducation should be compulsory. In general, work is found for the reeducated by local societies. In the early days of the war some 50 such societies were formed in Paris alone. An employment bureau under the Ministry of War has now been in operation for over a year and has 21 branches in as many military districts of France. Special effort is being made to prevent the influx to Paris of disabled men seeking work. The Association for Aiding the Mutilated Poor has arranged a system of loans with security to help men start work.

In June, 1917, there were 41 departments in France possessing professional schools.

All work of this character in England is far behind the organized French effort, and it has been found that there the number of men spoiled for future work and worthy activities by the entertainment and many kindnesses lavished on them during their stay in hospital is very large. In England, too, many men after training show a lack of willingness to fall in with factory rules and regulations where they are employed.

The driving of motor vehicles should not be considered a suitable occupation for men who have lost any portion of a limb or an eye, but they may be useful as attendants in garages. Incidentally it may be noted that these occupations are being invaded by women.

Electric shops and the cinematograph industry offer a field for this class of labor. Special looms have been devised to be operated by cripples. Cripples and one-armed men are employed as ticket collectors and buss conductors. The following occupations are suitable for the totally blind:

MEN.	WOMEN.
Basket making.	Book folding.
Mat making.	Ironing factory.
Knitting.	Typewriting.
Sewing.	Artificial flower making.
Chair caning.	Knitting.
Pianoforte tuning.	Sewing.
Boot and shoe making and repairing.	
Massage.	
Typewriting.	
French polishing.	
Gardening.	

The attempt to find occupation for the disabled is less difficult in the case of unmarried men, who are not restricted to a particular locality by the needs of their families.

A national registry of disabled men should be maintained, and there should be one central agency for employment, to which every ex-sailor, ex-soldier could turn at will.

The British war office has established special hospitals to give inpatient and outpatient treatment to soldiers.

Definite places have been established for treating (1) the blind; (2) amputation cases (*a*) when nearly ready, (*b*) when fully ready to be fitted with artificial limb; (3) orthopedic cases; (4) neurological cases; (5) rheumatism and kindred complaints; (6) injuries of face and jaw and cases requiring artificial eyes; (7) heart cases.

Reprints from the "Daily Review of the Foreign Press." Issued by the General Staff, War College, January to April, 1918.

VINCENT'S ANGINA.

Formerly regarded as rather infrequent and of special interest, as a condition associated with the presence of two micro-organisms—a fusiform bacillus and a spirochaete—this form of infection, described in 1896 by Vincent, has become extremely common, and even known as "trench mouth." The tonsils are most often attacked, and diphtheria may be diagnosed; the mouth, gums, bronchial tubes, and in rare instances the prepuce may also be infected. Locally iodine, salvarsan, or liquor arsenicalis swabbed on three or four times daily, are effective. Nolf, Colard, and Spehl record two cases of Vincent's angina with a rash, an erythema in one, a generalized maculo-vesicular eruption in the other. In both cases the intravenous injection of neosalvarsan was followed by the rapid disappearance of the faucial and cutaneous changes.

SKIN DISEASES.

Horse mange.—In peace horse mange was not common in the Central Empires, but during the war it has been imported from Poland and Serbia and has spread to man and even from man to man; Pick, who examined a number of cases in unfavorable circumstances, thus contracted it. He has never seen *dermatokoptes* or *dermatophagus* mange but always the *sarcoptes* form. The incubation period is short—two to three days—and then groups of small pale nodules the size of a pin's head appear on the back, trunk, flexor surfaces of the upper extremities, groins, and thighs, the distribution being ascribed by Reif to hair and scales falling down inside the collar. The wrists hands, penis, face, and scalp escape. As in scabies, itching when the patient gets warm in bed is troublesome; but, unlike scabies, there is no associated impetigo or eczema. Burrows are not seen, probably because the parasite is more superficially placed than the *Acarus scabiei* in the skin. Spontaneous cure occurs in from one to three weeks. Prophylaxis consists in washing with carbolic soap, rubbing on perugen or petroleum after working in the stables. As a cure, Weidner speaks highly of petroleum (℥i) rubbed on the skin until it is dry once daily; mild cases are cured by a single application, severe ones after two to four. The clothes and bedding should be disinfected.

ŒDEMA OF PRISON CAMPS.

Œdema among soldiers on active service is generally due to so-called war nephritis, whereas the œdema in prison camps is of a different nature. Hülse, who observed 185 cases in the war prisoners' camp at Neuhammer, regards this œdema as a manifestation of

inanition due to many causes; a small percentage (22 per cent) showed a definite infection, namely malaria (24 cases), tuberculosis (7 cases), recurrent fever (1 case); but most of the cases were due to the bad conditions of life in a prisoners' camp, namely, bad feeding, overwork, cold and damp rooms. Rapid improvement followed better dietetic and hygienic conditions without any drug treatment. As a diet abundant in quantity but poor in vitamines was followed by the same improvement as that due to a diet containing the same number of calories and rich in vitamines, it is concluded that the caloric value and not the vitamine content is the important factor in the disease. This is an important point, as the œdema might naturally have been ascribed to a deficiency in the antiscorbutic vitamine and to be a manifestation of avitàminosis.

The œdema of war or of prisoners' camps occurred during the Napoleonic campaigns, the siege of Paris, and in the concentration camps during the Boer war, when it was known as epidemic œdema (Maliwa). Falta, of Vienna, in a review of the subject mentions that the disease was well known in Russia during famines before the war, and that the expression "swollen from hunger" was current in the affected districts. During the war the first record of the disease was in 1915 by Strauss, who described "the hunger disease" in Russian Poland and Galicia, where the poor were much exposed to war epidemics and had an insufficient and monotonous dietary. It has also been called "potato disease" and "salt hunger." About the same time Budzynski and Chelchowski recorded 224 cases in Galicia; roughly, half these cases were in children between 2 and 10 years of age, and the remainder in elderly subjects, the condition being often associated with anæmia, debility, and intestinal disorders. In Germany the disease first made its appearance in prisoners' camps in July, 1915; and as 66 per cent of his cases had the *Spirochaeta recurrentis* in the blood, Rumpel at first considered relapsing fever responsible, but in 1916, when many cases with dysenteric symptoms occurred in prisoners' camp free from relapsing fever, Rumpel and Knack regarded dysentery as a disposing cause. At this time cases were reported among Russian soldiers at the front where direct contact with infectious disease was thought to be excluded. Early in 1917 there were numerous cases in the civil population and labor battalions in Germany, and in the spring cases first appeared in Austria among civilians, especially workmen, but rarely among the troops. The affection has also been often reported in Asia Minor.

The disease may occur at any age, but children, elderly people, and men engaged in hard physical work are especially likely to suffer. Its features are remarkably uniform; the œdema resembles that of renal disease and in mild cases may be confined to the lower

limbs, but in severe cases is universal and may cause considerable limitation of movement; it is soft and elastic, and the skin anp puncture fluids pale; it may come on gradually or, especially after physical exertion, rapidly. With rest in bed and good feeding the œdema, which is most persistent in the face, usually disappears in a few days, and then reveals extensive emaciation with loss of weight up to 50 per cent. After the disappearance of the dropsy relapses are prone to occur, especially if there is an early return to hard work or unsuitable food. The urinary symptoms are polyuria and frequency of micturition; the urine being clear, of low specific gravity, free from albumin, urobilin, and from formed elements except a few hyaline casts. Franke and Gottesmann are the only observers who described functional disturbance of the kidneys in war œdema, but Schiff believes that they were really dealing with cases of chronic nephritis. Franke and Gottesmann in their study of the functional efficiency of the kidney in 17 cases of war œdema found delay in the excretion of urea and sodium chloride in 10 patients, and of potassium iodide and milk-sugar in 7; and they therefore call war œdema a nephritis without albuminuria. It is, of course, well recognized that cases of acute nephritis with œdema may occur without albumin or casts in the urine. This was known to R. Bright, and recently His has described cases of war nephritis without albuminuria with impaired excretion of water and salts just as in cases of undoubted renal disease with albuminuria and dropsy. Falta states that the slow pulse characteristic of war œdema—sometimes 35–40 per minute—is best marked in males. There is hydraemic anæmia, and slight leucopenia with relative increase of the lymphocytes has been observed. Subacidity and diarrhea with mucus and blood may occur. Prostration, apathy, and weakness are almost constant; pains in the calves, a feeling of heaviness in the legs, and diminished reflexes may be noticed, but typical polyneuritic symptoms do not occur. In severe cases night blindness, corneal ulcer, or xerosis of the conjunctivæ may be troublesome. The prognosis is good if the patients are kept in bed on a proper diet, but severe cases may prove fatal. The diet should be ample, especially as regards proteins, and during convalescence the patient should be in the open air. Post-mortem examination shows chronic marasmus with atrophy of the viscera, especially the heart and spleen, fatty degeneration of the liver and kidneys, and in some instances dysenteric ulcers. Falta states that war œdema has no connection with scurvy, except that in very rare instances the two diseases occur in the same person. The wet stage of beriberi is the only other deficiency disease in any way resembling war œdema in which, as already mentioned, there is no polyneuritis. All the patients have been improperly fed for a

long time, especially as regards proteins, and the liability to œdema always present in malnutrition is aggravated by the large quantity of sodium chloride in the food. Maliwa, from investigation of four cases, correlates the stage of colyuria with an excess of sodium chloride in the blood, and finds that after the polyuria has passed off the blood is then deficient in the sodium chloride content; the change in the osmotic relations of the tissues is the essential factor in the disease, the polyuria and œdema, though prominent clinical features, being secondary in importance.

MALARIA.

As in France, the return to the Central Empires of numerous men infected with malaria, though many are unconscious of it, as they have not had an attack, is arousing some anxiety on the ground that the disease may thus be introduced into the Fatherland. Külz, in discussing the question whether or not a recent uncomplicated case of malaria should be sent home, takes this possibility, in addition to other reasons, into account, and decides against the return of the patient. As men with latent malaria may after their return home have a first attack as a result of chill, operations, powerful drugs, physical or mental strain, or the depressing effects of illness, Keller naturally advises that obscure fever in a soldier who has come from a malarial country should always demand a blood examination in order to determine if malarial infection alone or combined is present.

The interrelations of war wounds and malaria are discussed by Moreau, who points out that most of the wounded from the East have malarial attacks in France, and that, though their nature may be quite obvious, they are sometimes regarded as due to wound infection. The first attack of malaria may follow a wound in a man with latent malaria, or a relapse may thus be induced. The gravity of the wound has some relation to the severity of the malarial attack; a severe fracture with shock and hemorrhage may be followed by pernicious malaria, a simple fracture by benign tertian. The opening of an abscess due to quinine injections may determine a relapse, and an antityphoid inoculation may have the same effect. The interval between the wound and the first malarial attack is between two and four weeks, but in patients previously the subjects of frank malaria it is considerably less. Conversely, the existence of malarial infection delays the healing of wounds and the union of fractures, and hence wounded from malarial countries should be given quinine, especially those who have already had febrile attacks. It has been stated that malarial patients when wounded are especially prone to secondary hemorrhage, but Moreau's experience does not support this view. Malaria, however, so modifies the resistance of the liver that delayed chloroform poisoning is facilitated.

LATENT TETANUS.

A case is reported of a soldier who received a gunshot wound of left thigh on September 20, 1916. By suitable treatment the wound had mostly closed up by the middle of December, although a sinus still remained. On January 15, 1917, the scar was opened up and part of the callus removed, this being followed by the extrusion of several sequestra. A second operation, undertaken on April 28, was followed by the appearance of other sequestra. On May 6 he was seized with pains in the muscles of the jaw and developed typical generalized tetanus, which was quelled, however, by antitoxin, magnesium sulphate, and general analgesics, recovery ensuing within a month. So far as could be ascertained no prophylactic dose of antitoxin had been injected in this case. The tetanus developed eight and one-half months after the injury. Discussing various possibilities, the author considers that the tetanus infection took place at the time of the injury, the bacilli remaining latent in the cicatrix until set free as a result of the subsequent operations.

HYPNOTISM AS AN AID IN THE DIFFERENTIAL DIAGNOSIS BETWEEN HYSTERIA AND EPILEPSY.

In the case of soldiers who are so frequently brought to hospital with a history of attacks supposed to be epileptic, but who have been seen in the attacks by laymen only, Neutra has found hypnotism a valuable method for determining the character of the attack. The hysterical patient at the word of command reproduces the complete attack in all its details, whereas the epileptic, though he may carry out all the commands, shows no reaction.

SANITARY CONDITIONS ON THE ITALIAN (ISONZO) FRONT AMONGST THE AUSTRIAN TROOPS.

Preventive vaccination is carried out systematically, viz, every three months against cholera, every seven months against typhoid, against smallpox only if there is any danger, and after dysentery only occasionally. All wounded are given tetanus serum. All vaccines and sera are in the hands of every medical officer with the forces.

GERMAN VITAL STATISTICS.

In Prussia during 1914, 766,828 persons died, viz, 449,645 males, including soldiers, and 317,183 females. In 1913 the total was 620,455 persons, of which 321,980 were males and 298,475 females. The excess of deaths in 1914 over 1913 was therefore 146,373.

From infectious diseases there were 151,542 deaths (19.75 per cent), and among these 58,577 (7.64 per cent) from tuberculosis. In 1913 the deaths from tuberculosis were 56,861. Reckoned per 10,000 living, the mortality from tuberculosis in 1913 was 13.65 and in 1914, 13.87.

Table 3.

	Deaths in German towns of 200,000 inhabitants and over.		Total deaths in civilian population.		
	1917	1916	1913	1917	1916
January	18,907	13,601	13,326	13,539	12,339
February	20,922	14,913	12,135	16,347	13,105
March	19,996	16,517	13,795	15,926	13,812
April	18,946	16,406	13,014	15,177	12,161
May	18,376	16,282	12,660	14,171	11,418
June	17,159	14,807	11,447	12,212	10,233
July	18,577	15,275	11,654	13,190	9,813
August	18,582	15,659	11,411	12,980	9,609
September	17,685	15,817	11,176	11,804	9,736
October	17,586	16,922	12,139	11,823	9,648
November	15,958	17,340	11,758	11,564	10,647
Total (11 months)	202,694	173,539	134,515	148,733	122,521
December	.....	19,049	12,693	.....	13,720
Total (12 months)	.....	192,588	147,208	.....	136,241

Table 4.

	1917	1916	1913
Total deaths in civil population	148,733	122,521	134,515
Deaths under one year	18,087	18,462	31,991
Deaths over one year	130,646	104,059	102,524

Table 8a.

	Deaths from tubercular diseases.					
	1917		1916		1913	
	Total deaths.	Rate per 1,000.	Total deaths.	Rate per 1,000.	Total deaths.	Rate per 1,000.
January	2,060	2.2	1,704	1.7	1,598	1.7
February	2,258	2.6	1,870	2.0	1,490	1.8
March	2,829	2.9	2,111	2.1	1,772	1.9
April	2,890	3.1	2,034	2.1	1,758	1.9
May	2,983	3.1	2,026	2.0	1,702	1.8
June	2,727	2.9	1,792	1.9	1,474	1.6
July	2,337	2.4	1,599	1.6	1,394	1.5
August	2,129	2.2	1,468	1.5	1,351	1.4
September	2,053	2.2	1,449	1.5	1,221	1.3
October	2,128	2.2	1,390	1.5	1,391	1.5
November	1,911	2.0	1,526	1.6	1,369	1.5
Total (11 months)	26,305	2.3	18,969	1.6	16,520	1.5
December	.....	.....	1,809	1.9	1,471	1.6
Total (12 months)	.....	.....	20,778	1.8	17,991	1.6

Table 8b.

	Deaths from respiratory diseases.					
	1917		1916		1913	
	Total deaths.	Rate per 1,000.	Total deaths.	Rate per 1,000.	Total deaths.	Rate per 1,000.
January	2,567	2.7	1,903	1.9	2,038	2.2
February	3,796	4.4	2,456	2.6	1,880	2.2
March	3,222	3.4	2,776	2.8	2,229	2.4
April	3,032	3.2	2,091	2.2	1,865	2.1
May	2,461	2.6	1,775	1.8	1,669	1.8
June	1,672	1.8	1,441	1.5	1,153	1.3
July	1,365	1.4	1,118	1.1	1,144	1.2
August	1,093	1.1	920	1.0	998	1.1
September	1,145	1.2	1,000	1.0	941	1.0
October	1,149	1.5	1,263	1.3	1,254	1.3
November	1,731	1.8	1,551	1.6	1,432	1.6
Total (11 months)	23,533	2.1	18,303	1.6	16,603	1.5
December	.....	.....	2,652	2.7	1,800	1.9
Total (12 months)	.....	.....	20,955	1.8	18,403	1.7

INFANTILE MORTALITY IN GERMAN TOWNS.

In the 26 large cities the number of infants born alive was reduced by 48,623 as against the previous year, in which there was already a drop of 49,470 from the number registered in 1914, so that the total fall in births up to the end of 1916 amounted to 98,093, or 38.3 per cent of the number of infants born alive in 1914. Whereas in 1915 there was a rapid fall in May, in 1916, the decline was more evenly distributed throughout the 12 months, there being, however, a distinct increase in the figures for August and September as against July. This was noticeable not only in the large cities but also in the other localities, and should be connected with the period of Christmas leave extensively granted to the soldiers in 1915. The previous curve had shown its apex during the winter months and its lowest limit in autumn. In localities with 15,000 or more inhabitants the figures for 1915 had shown a decline of 131,068 as compared with 1914, and the year 1916 shows a further fall of 114,557, so that the total diminution since 1914 until the end of 1916 amounted to 245,625, or 39.5 per cent of the live births in 1914. Thus the figures for the two groups of localities run closely parallel. This extraordinary decline of births is not compensated for by a simultaneous fall in infant mortality, though the latter fall has progressed more rapidly than the former. In the large cities the deaths among infants were 13 per 100 live births as compared with 15.3 in 1914, and in the other localities the figure is 13.3 as against 15.5. Thus the infantile

mortality has fallen below the previous minimum of 14.1 reached in 1912. In the last quarter of 1916 there was, however, a distinct increase in the infantile death rate. There is no reason to incriminate climatic conditions, since those were the same both years—under normal summer heat—and should have made rather for a reduction in mortality. It does not seem clear whether the increase may be connected with the upward curve of live births, for the figures of mortality in the first month of life, which alone could answer this question, are not supplied by the imperial health office. Factors other than the biological must have been responsible for the increase, and it is only a local inquiry conducted in some of the big industrial centers which could elucidate the problem adequately.

THE EDUCATION OF THE BLIND IN GERMANY.

Of 40,000 blind people in Germany before the war, only 0.2 per cent belonged to the class with university education. But since the war the number of blind people with academic ambitions has increased so much that facilities had to be created in order to satisfy a real want. A society was formed called "University Library, College, and Advisory Board for Blind Students." Committees were established for the task of elaborating the best type of blind script for scientific works and of deciding on standard textbooks in the various faculties. In many towns associations were formed for the training of voluntary workers, mostly female, for the production of library books in blind script. The advisory board gives information and help to blind students and blind professional men all over Germany. In Marburg, a prettily situated small university town, a college for the blind has now been opened with resident as well as nonresident students. It was frequented by 17 students during the first term. The teaching staff includes three blind tutors—a theologian, a philologist, and a jurist. The building is situated near the university, surrounded by a garden, and contains workrooms for a bookbinder, a printer, and 21 living rooms, of which 7 are allotted to resident students.

SCURVY.

Extensive outbreaks of scurvy have occurred on land during wars since the Middle Ages; thus, 55 out of 143 endemics analyzed by Hirsch were during hostilities. Three previous endemics in prisoners' camps have been recorded: (1) 159 cases among 10,000 French prisoners in the Ingoldstadt camp in 1871, (2) among prisoners at Port Blair in the Andaman Islands, and (3) among the Hereros in the Southwest African War, the last two being the more serious. In recent wars hygienic measures have prevented scurvy, and only in Russia or countries where the disease is endemic or sanitary

methods are in grave default are large endemics probable. The outbreak among the Austro-German prisoners in Turkestan was much more extensive than in former wars; Disqué saw 504 cases in one military hospital, and in a camp of 4,000 prisoners there were 754 cases, or 19 per cent. The largest number of cases occurred in March (222) and April (158), when night blindness also increased. The incidence of this large number of cases in the spring was attributed to bad hygienic conditions and the absence of green vegetables during the winter. In the initial stages the permeability of the vessel walls was shown by papules and slight discoloration around the hair follicles on the lower limbs, the skin feeling rough like a grater; changes in the gums occurred in three-fourths of the cases.

Among the complications were four cases of hemorrhagic pleurisy, three of hemorrhage into the capsule of the knee joint, and one of well-marked subconjunctival hemorrhage. The only case of hemorrhage from internal mucous membranes was from the stomach. The blood examination showed a secondary anemia, but no other change was noted. Among 504 cases there were 4 deaths only, those with hemorrhagic pleurisy. In addition to suitable diet and hygiene calcium lactate was given, and appears to have been most successful, as under its influence the largest cutaneous and muscular hematomas disappeared in two to three weeks, whereas without it the process occupied months.

Giugni observed an outbreak of what appears to have been scurvy among the Italian troops, especially the infantry, at a high elevation in the Dolomite Alps (1,500–2,000 meters), beginning in June, 1916, increasing during July, reaching its acme in August, declining in October and November, and disappearing in the winter. The disease spread in an epidemic fashion to neighboring areas, but not to the same extent as in the original focus, and some sporadic cases were seen at the base. The duration of symptoms ranged from two weeks to two or three months; there were no fatal cases. Blood cultures gave negative results. The etiological factors in the order of their importance are given as the high altitude with rarefaction of the atmosphere, mountain climate, reflection from the snow, the influence of the special emotional state of the troops on active service on the peripheral circulation and blood pressure, and the restricted diet. The administration of vegetables did not exert any curative effect, but some improvement followed the use of salicylates and adrenalin.

During a mild epidemic of scurvy among soldiers, Tüchler found that at least 60 per cent of the patients, including those already ill for three or four weeks, were in an excellent state of nutrition. So far from there being any relation between the severity of the attack and the general state of nutrition, many soldiers in good

condition showed the most extensive hemorrhages in the skin and gums. The occurrence of an initial rigor, the continued fever, and the microscopic data led Tüchler to support the view that scurvy is an infective disease, but he does not agree with Much and Baumbach (*vide* MEDICAL SUPPLEMENT, Mar. 1, 1918, p. 67) that the infection is conveyed by lice, as all his cases appeared after satisfactory measures for combating this pest had been established. That a restricted diet is only a predisposing cause was suggested by the observation that patients treated with fresh vegetables and lemon juice did not improve more rapidly than did those on the diet of the troops at the front. The influence of dark and damp quarters in producing the disease was shown by the cessation of fresh cases when stationary warfare was succeeded by active campaigning in the field, and by Weinberger's experience that a regiment provided with a good diet was regularly attacked by scurvy when sent into dark quarters.

GLUECK, B. **A study of 608 admissions to Sing Sing prison.** Mental Hygiene. Vol. 2, No. 1. January, 1918.

From a sociological standpoint, the author has made a very exhaustive study into conditions at Sing Sing prison, New York, and the results of this investigation are very interesting. The article is rather an exhaustive one, and for that reason a brief review would be of little value to the interested party, but it is recommended for careful study to the members of the medical corps of the service who are interested in prison reform work and possibly also those that are on recruiting duty. The phase of the subject relative to the unnaturalized element in admission to Sing Sing would be of particular importance to the latter. Just at this time, when there is so much reform work going on throughout the country relative to prison conditions, the causative factors in the individual prisoner's offense to the Government, and so forth, the article will appeal to medical officers in the service on duty at the various naval training stations, where an effort is being made to exclude the mentally unfit. The author, as far as can be seen, has brought out no new facts, in reality he has recapitulated certain statements which he has made in other journals, but the way in which the matter is handled makes it particularly valuable and the information from the statistical standpoint is invaluable.

Of the 608 cases studied, 66.8 per cent showed abnormal behavior of some kind during their life previous to admission; 59 per cent deviated from the average normal mental health; 28.1 per cent were found to be defective by the usual psychological tests, and the average age of the prisoner under this group was found to be 12 years. He classes 18.9 per cent under constitutional psychopaths, who evidence a lack of ability to adjust to the environment in which they have been

placed. Attention is called to the fact that of the 18.9 per cent of psychopaths at present in the prison, 82.4 per cent are to be discharged in the near future to return to civilian life. Of the latter group 86.7 per cent have averaged 3.9 former admissions to prisons. Of the cases examined, 12 per cent were found to be suffering from definite mental illness.

In the past years, those who have attempted to make certain prison reforms have pointed out the fact that the method of dealing with the offenders is entirely erroneous, in view of well-recognized psychological laws and in practically every part of the country the offense, and not the individual, is dealt with. As a result when mental defectives, or constitutional psychopaths, commit an offense against the law they are merely placed in prison for a term of years and no attempt is made to correct the basic condition. Of course, the place to begin reeducation is in the schools of the country, where an effort should be made not only to educate the individual along technical lines, but to instruct him along certain lines that he may be able to live without coming into conflict with his environment.

The author classifies the various cases examined under four headings: Intellectually defective group, mentally diseased group, psychopathic group, and the unclassified group. With the prisoners so classified recommendation is made that certain well-defined efforts be made to reeducate the individual along the lines that are indicated by the classification. An interesting thing brought out in the investigation is the fact that 35.3 per cent of the prisoners examined were foreign born. Of these, 58.2 per cent were below par mentally and for that reason, of course, could have been excluded from the country on the emigration law. Of the original 35 per cent, many were of the constitutionally inferior make-up, and only 10.3 per cent had become naturalized citizens. (D. G. S.)

REPORTS.

SURGICAL NOTES FROM THE FRONT.[1]

By R. G. LE CONTE, Surgeon, United States Naval Reserve Force.

The number of wounded and injuries sustained.—Modern trench warfare has repeatedly given similar statistics as to the number of wounded and the location of wounds in offensive and defensive measures. A French division is at present composed of from 11,000 to 12,000 men. At the time of attack each division will have 400 wounded the first day; if the attack persists, there will be 400 wounded on the second day; on the third day the number falls to half, or 200, while on the fourth day the casualties will be small, for exhaustion has rendered that division useless for fighting.

In the same way the situation of the wound is known beforehand with almost mathematical precision. The following table of figures has been verified many times by the French and may be considered accurate:

	Per cent.		Per cent.
Head and neck	16	Chest	10
Arm	14	Abdomen	4
Forearm	8	Spine	2.6
Hand	12	Thigh	15
		Leg	12
Total	50	Foot	6
		Total	49.6

Head and upper extremities furnish 50 per cent, trunk and lower extremities 50 per cent, and of multiple wounds there will be 20 per cent. Knowing the number of divisions that will participate in the attack, the plans of transporting and treating the wounded are arranged beforehand.

Treatment of wounds.—The first step in the mechanical cleansing of wounds is taken at the battle dressing station, where the wound is covered or packed with sterile gauze. This dressing acts as a wick and removes germs from the wound as it absorbs the wound secretions. Upon arrival at the first advanced hospital a bacteriological examination of this first dressing will disclose the flora of the wound.

Excision of the wound, the debridement of the French, consists in largely opening the wounded area and removing all contused and damaged tissue and foreign bodies that may harbor infective germs.

[1] Extract from report to Bur. M. & S., March, 1918.

This exposing incision must be so placed that it will not cause any further destruction of anatomic tissues of value. In the extremities, incisions should be in the long axis of limb and transverse only in the depth of wound, where the muscle masses are so large that complete access to the damaged tissue can not be had otherwise. Transverse incisions should be confined to muscle and aponeurotic structures and the nerves and vessels spared. All damaged muscle must be excised, and the differentiation from healthy muscle is made by its change of color and loss of contractility. The zone of contamination is not limited to the track of the projectile and may extend half an inch to an inch beyond it. As the debridement proceeds, the foreign body will be removed from the depth of the wound, together with the contaminated tissues. The object of this excision is twofold—to remove infection and to place the wound in the most favorable possible condition for closure by suture. Rigid hemostasis is called for, with dryness of the wound, and drainage is seldom indicated and then only for a short time. When possible the whole wound is excised in the same manner as a tumor, the knife cuts being confined to sound tissue; but where the wound is deep, tortuous, or extensive, such an ideal method is impossible. After the sutures are placed, they may be tied immediately if the bacteriological examination of the wound or dressing prior to the excision shows no organisms of special virulence. The streptococci must always be considered virulent, as their bacterial differentiation is too time consuming to be attempted. The sutures may be tied in an hour if the bacteriological examination of the wound after debridement proves favorable. They may be tied in five or six days after disinfection of the wound by chemical means. The terms "immediate primary suture" and "delayed primary suture" are used to define the time when the sutures are tied and the wound definitely closed. Secondary suture is employed where the disinfection of the wound requires more than a week of time. As the wound then is covered with granulations, the edges must be freshened, which requires a second operation of small importance. Secondary suture never gives as good a restitution of function as primary suture; it retards convalescence, but it has the advantage of giving a complete assurance of recovery. Collaboration between the surgeon and a skilled bacteriologist, I need scarcely add, is essential for a large percentage of success.

Gunshot fractures.—On entering a fracture hospital or fracture ward, one is at once struck by the similarity of its appearance in all armies. This is due to the almost universal adoption of suspension and the principles of the Thomas splint. This splint has been modified in a score of different ways, but its principles have never been interfered with. Here the similarity ends, for there is a wide difference of opinion on all else concerning the gunshot fractures.

Broadly speaking, there are two schools. In one the treatment is directed chiefly to complete reduction and proper alignment of the bone, while the wound is regarded as of secondary importance and its care is reduced to the use of vaccines and to protective or absorbent sterile dressings. The other school considers the earliest possible closure of the wound of paramount importance, believing that the proper alignment of the bone can be left to a later period. This latter school is in the majority, and to them is due the increasing number of fractures that are treated by debridement and primary suture. This is done with great success in the smaller bones, with less in the humerus and tibia, and only occasionally is it warranted in the thigh. For the mechanical cleansing of the wound, excision of all damaged structures is required. Theoretically every bit of the shattered and loose fragments of bone should be removed, the marrow curetted, and the damaged periosteum excised together with the damaged soft parts. With so thorough a mechanical sterilization, primary union may be expected, but the removal of so large an amount of tissue will cripple the limb, and may even render it so useless that amputation is later resorted to. Also in closing primarily a fracture of the thigh, the dangers from sepsis and gas gangrene are much increased.

A safer method of treatment is therefore a partial debridement of the soft tissue, with removal only of such fragments of bone as are loose and unattached to periosteum. In other words, remove tissue that is evidently dead and all else that has a spark of life is left for chemical disinfection or later removed in the event of the formation of sequestra. In so grave an injury, and in the presence of shock, the short quick operation of *partial* debridement has evident advantages.

Gas.—Two types of gas are used now by the enemy. One is a vesicating irritant to the skin and mucous membrane, the so-called mustard gas, while the others produce death from inhalation. The vesicating gas is commonly dichlorethyl sulphide (does not contain mustard), and its irritating effect is not immediately noticeable. It pervades and penetrates the clothing, and the longer this is worn the more intense will be the burning. The handling of shell fragments, of the clothes, and any other article that has come in contact with this gas will burn the hands unless they are protected by leather or rubber gloves. When treatment is started early its effects are evanescent even on the conjunctivæ, and the patient will return to duty in a few days. Where treatment is delayed, the resultant burns may incapacitate for some weeks. The scrotum, inner surface of the thigh, and armpits are the portions of the body most severely burned. When possible treatment is started at the first dressing station by making a change of clothing. At the advanced hospital patients are at once stripped and washed with lime water, the eyes

bathed with it, and the mouth, nose, and pharynx treated with the same solution. Lime water is specific and neutralizes the gas immediately. The clothing is speedily removed from the hut through a chute, and it is handled with gloves. The advanced hospital will treat in this way 100 cases an hour.

For the lethal gases which produce dyspnea and edema of the lungs, the treatment is very limited. Oxygen gives some relief from the distressing symptoms, and chambers are prepared in the advanced hospital in which oxygen is liberated from cylinders, and the patients are placed in this atmosphere for 10 minutes. Usually there are two rooms of different size and known dimensions, and one or both are used according to the number of patients. For the rest venesection completes the immediate treatment.

SURGICAL NOTES TAKEN AT VARIOUS BASE HOSPITALS IN FRANCE, JANUARY, 1918.

By D. F. Luby, Passed Assistant Surgeon, United States Naval Reserve Force.

Many young surgeons are now entering the Medical Corps of the Army and Navy, leaving their active civil practice to take up for the first time military surgery. Some of these surgeons are already familiar with the treatment of war wounds, either through experience gained abroad or through the writings and instructions given us by such men as Dakin, Carrel, Joseph Blake, Hutchinson, Keller, Crile, and others. But to those officers who do not come in this class, especially surgeons doing transport duty, I write my findings covering my recent visit to the Hôpital Complémentaire at Ris Orange, to the Base Hospital at the Pasteur Institute, and to the Hôpital St. Nicholas, Versailles.

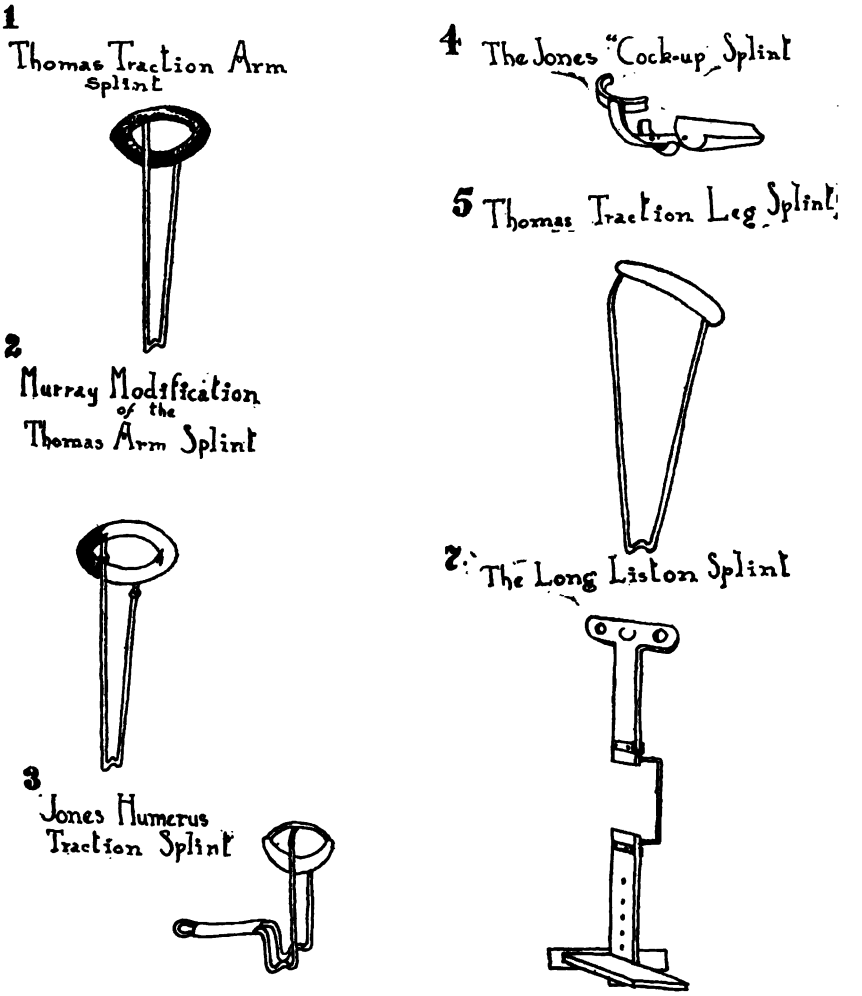
Should any of the transport surgeons find opportunity to go to the above places, it will be to their distinct advantage, for at these places they can see every kind of war wound undergoing the latest procedures, whether in progressive sterilization, primary suture, immobilization by the latest splints, or treatment of burns, keloids, trench feet, etc.

For some time to come the surgical service of the transports will in all probability be of a light nature—the medical department being far more active combating pneumonia, communicable diseases, etc. But the time is not far off when these surgeons may be called upon to care for the many wounded men who may be transported to bases in America.

If this proves true and we are to take wounded soldiers to America, then teamwork between the Army surgical units and Navy transport surgeons must be developed in caring for the wounded in order that there be no break in the continuity of treatment other than in

the event of an untoward complication; and therefore individuality in the latter service must be limited to that of carrying out the treatment already prescribed at the Army bases.

The French have developed surgical teamwork to a high degree of effectiveness in their base hospital service. The teams operating from the advanced dressing stations through to the third-line base



hospitals in the army formations achieve remarkable results—due not only to their advanced methods of procedure but also to the enthusiastic support which the teams at the third line of base hospitals give to those cases coming through from the second and first line base hospitals, each base vieing with the other in carrying out perfectly the lines of the original treatment.

I understand that this same system of teamwork will be inaugurated in the American Army surgical bases, following a report made by eminent surgeons, who have spent a long time investigating the French system. Therefore it becomes an important question with transport surgeons to know what principles the Army Medical Corps will inaugurate in the handling of its wounded. With this in mind, I went to Base Hospital No. 76, Ris Orange, France, (Medical Chief Col. W. A. Keller, United States Army, in charge), a large brick building, formerly an old convent school, capacity 210 beds, with operating rooms, X-ray and photographic equipment, blacksmith shop for appliances, etc. This hospital has seven auxiliary hospitals which receive the overflow when an action is taking place. The service is very active. Beds are always filled with patients, mostly for treatment of compound fractures of every type.

The work that Col. Keller has been doing at this hospital stamps him as being one of the leading American surgeons in the field of military surgery to-day. It was a distinct pleasure for me to make the rounds with this officer and see his results, particularly with regard to primary suture, his method of obtaining mobilization, traction, and progressive sterilization.

At this place Balkan frames are used entirely for suspension of wounded limbs; Thomas, Jones, and Cabot splints for immobilization purposes, and Carrel-Dakin solution for progressive sterilization.

Col. Keller in his treatment of fractures advises against the removal of any splinter of bone that has the smallest piece of periosteum attached to it, showing many cases of good union where this was done, even when the radiograph showed the splinters to be detached from the bone itself. Osteogenesis will take place if realignment is established and traction and immobilization begun.

The majority of cases at the hospital are of the secondary suture type, but the few cases that I saw where primary suture was attempted leads me to believe that this method of procedure will prove beneficial by reducing the suffering of the wounded and by saving time, but only if attempted under certain fixed principles. I still feel that conservatism should be exercised in sewing of war wounds that are likely to become infected a few hours after so doing. Surgeon W. B. Brinsmade, United States Naval Reserve Force, just returned from a visit to the British front, informs me that in many cases where primary suture was attempted at the clearing station all this suturing had to be removed and progressive sterilization begun when they arrived at the base hospital. Bryan at his station on the British front seldom closes a wound, finding after a large experience that the wounds do better if left open.

However when one sees and studies the experience of the French surgeons with primary sutures, a few principles stand out, which if

employed make this method of procedure worthy of consideration. The following are the essential features: At the nearest dressing station the wound is given first-aid treatment only, the limb immobilized with splint and traction applied, dry dressings are placed over the wound, and the wounded man is rapidly transported back to the base hospital, generally 20 to 25 kilometers from the firing line, arriving at the base inside of six hours (the earlier the arrival the more favorable the opportunity for primary suture.) The operating base is usually a large hospital of 1,000 beds or more, with operating rooms and X-ray equipment, appliances for immobilization and traction, with rapid transportation facilities, and under the command of a medical chief and his assistants. At the hospital it is possible for the surgeon to stay with his charge for the entire period of his convalescence, a factor paramount in importance when an attempt is made at primary suture. If the wounded man must be evacuated to Base "XYZ" the surgical unit in this latter hospital continues on the same treatment practiced at Base "ABC."

Primary suture once decided upon, based as stated above, upon early arrival after being wounded and the clinical judgement that the outcome will be favorable, the wound is converted into a surgical one by free incision along the entire tract of the missile, cutting away in every direction large ellipsoid chunks of skin, muscle, and fascia until contractile tissue is met, care being exercised not to injure large arteries, nerves, etc.

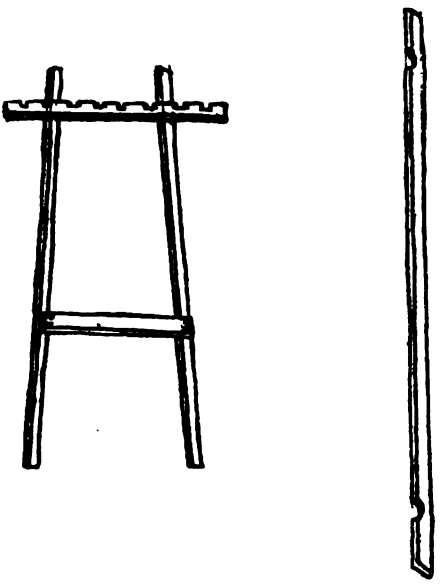
Wash out thoroughly with ether, or Tr. iodine, 5 per cent, and remove with utmost care all pieces of shrapnel, bullets, dirt and clothing.

If the wound is complicated by fracture the same principles apply, but do not remove splinters of bone, even though they seem loose in the field of operation. If these particles of bone be in juxtaposition with other fragments and are connected with the periosteum, osteogenesis will subsequently develop. (Col. Keller is a staunch advocate of this method, based upon experience in many hundred cases treated in this manner.) Small splinters of bone *not* connected with periosteum *should* be removed if they be free in the field of operation.

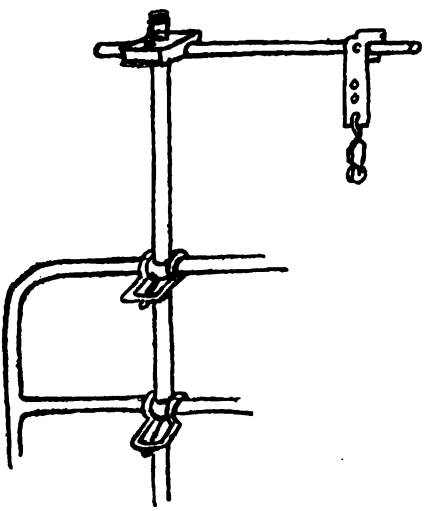
Primary suture in compound fractures is attempted by Capt. C. Leriche, when they are what he terms contact fractures (the bullet resting against the fracture zone) where joint surfaces are not destroyed, in cases of fractures that are compounded but sterile, and in penetrating fractures which are clean (where the missile has entered the medullary cavity and destroyed part of same at site of fracture).

Statistics collected relating to the battle of ——— show 80 per cent good results treated by primary suture, 10 per cent doubtful, and 10 per cent bad. In the battle of ———, with 50 per cent of cases so treated, 40 per cent show good results, and 10 per cent failures.

18 Wooden Overhead Bed frame



19 Maddox Unit Clamps, Iron Pipe and Bed Frame Clamp.



Targante treating seven cases as above had splendid results with four cases, while three failed because they were operated upon 22 to 42 hours after being wounded.

Thubat, in 1917, treated 44 cases of fracture with primary suture, getting good results in 40, and 4 cases being partially successful.

Capt. Charles Leriche, of the French Army, has had experience covering hundreds of cases of joints not treated by this method. Infection sooner or later developed which not only destroyed the joint but resulted in subsequent amputation. At his hospital primary suture is attempted in every possible case.

From observing many cases where secondary suture followed progressive sterilization and immobilization I am of the opinion that when there is a reasonable doubt in the surgeon's mind that the wound will become septic, rather than take the chance of primary suture this tendency toward infection should always be considered primarily and conservatism exercised for a period of three to four days while progressive sterilization is going on under the Carrel-Dakin technique, or with the Eusol method of British origin. If at the end of this short waiting period no infection develops primary suture can be attempted with impunity.

It follows, therefore, from my observations to date, that primary suture should be attempted only:

1. By surgeons of unquestionable ability.

2. At base hospitals with facilities to follow the case through to the end of convalescence.

3. When the operation can be done within four hours, because in the soil in which the men are now fighting tetanus and the B. Perfringens groups (Aërogenes capsulatus) abound. Gas gangrene develops in many cases inside three to four hours after being wounded; this because of four years of putrefaction and close association between animal bodies and the earth along the battle line; therefore biological reports upon soil character would prove beneficial in determining early primary suture.

4 In all wounds involving the pleural cavity closing the cavity only.

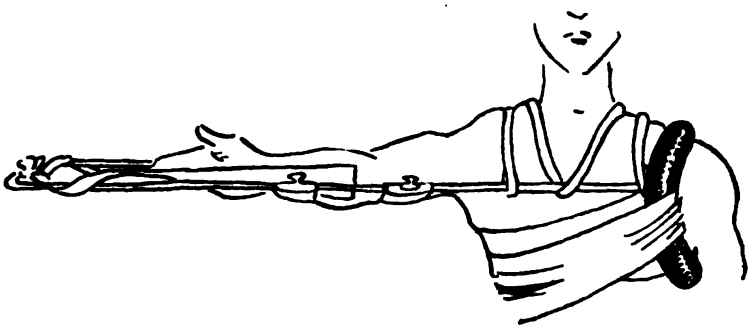
5. In joint conditions after removal of the splinter of steel where the articulating surfaces are not destroyed.

Because of the large percentage of good results in the French Army service, as shown by the records and reports of their greatest surgeons, this procedure should be favorably considered.

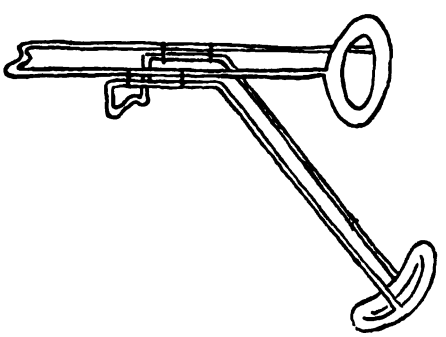
The majority of war wounds which I viewed on this trip were those associated with fracture and would eventually be closed secondarily, having undergone: (1) Progressive sterilization and biological observation; (2) fixation and immobilization by traction; (3) frequent radiographic observation.

Progressive sterilization.—The Carrel-Dakin technique was used at all three hospitals. At the Pasteur Institute Dr. Chutro is said to "out-Carrel Carrel" in this procedure. I went to his clinics on three

20 Thomas Traction Leg Splint
applied over uninjured shoulder
for shoulder and arm injuries



21 Adaptation of 2 Thomas Traction
Arm Splints



occasions, and when I came away it was fully impressed upon me that to know how a wound should be dressed by this method was one thing, but to actually do so correctly was another. For during the past three years I have been using this method of sterilization in indus-

trial surgical work, covering many hundreds of cases, with splendid results, but due, I feel now, to good fortune rather than to my method of procedure along this line of treatment, if I may judge by the manner in which Chutro works. He does all his own dressing. With the aid of five nurses he will pass quickly and quietly from one bed to another and spend usually three to four minutes to a case. Here are many cases of every description—fractured femurs, joints infected and lacerated arms—all with large gaping wounds of every size, showing the characteristic cherry red granulations, foaming with pus varying from a thick creamy type to the coryza mucous kind. This latter type of discharge marks the beginning of sterility.

Chutro technique follows: Garbed in sterile gown, wearing sterile gloves, holding a long artery clamp (Ochsner type) in each hand, he quietly stands by while one nurse opens up the thick pad (2 inches by 3 inches), which incases the injured member. The nurse removing the loose gauze about the tubes exposes the wound, next removing the tubes and disconnecting same from the glass holder. Chutro takes sterile gauze from a container, with artery clamp cleanses the wound of excessive pus. A sterile nurse has some sterile tubes at hand. He takes one with clamp and inserts same into wound, as many as he deems necessary; this same nurse now connects tubes to branched glass holder. The flow is started and wound is flushed. Gauze fluffs are now dropped upon the wound about the tubes by means of the artery clamps, the soft thick pad replaced about the limb, and its edges brought together and held in position by the artery clamps which are now discarded.

Dr. Chutro steps to bedside of the next case, receiving two new sterile artery clamps, and the same procedure takes place as above described.

The salient features of his dressings are:

1. No bandages are used, thus saving needless handling of the wounded member especially when fracture complicates the wound.

2. No human hand has touched the wound, thus lessening the chance of reinfection by contact.

3. The teamwork of his assistants and the silence that permeates the wards.

4. The large thick pad, 2 inches by 3 feet by 2 feet, quilted type, taking place of bandages; it forms a warm coat over the wound and catches the excessive overflow of the Dakin-fluid as it flows over the edge of the wound. It is not changed for one week at a time.

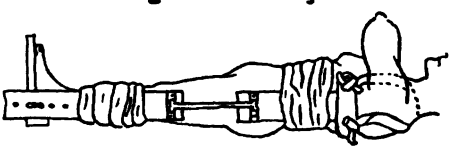
5. In all his fracture cases he does not use mechanical appliances for immobilization—depending upon an air mattress to accomplish this fact—the weight of the limb making a furrow of sufficient depth to act as a splint; traction in the usual manner.

6. Sterile white vaseline in large amount is smeared about the skin in the immediate vicinity of the wound before the dressings are applied in order to prevent burning of skin.

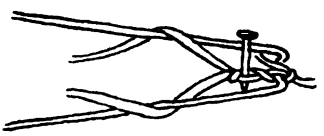
The English are using flavine[1] and eusol in most of their sterilization of wounds. Flavine has strong germicidal properties. Eusol

6 The Hinged Half-Ring Modification of the Thomas Traction Leg Splint

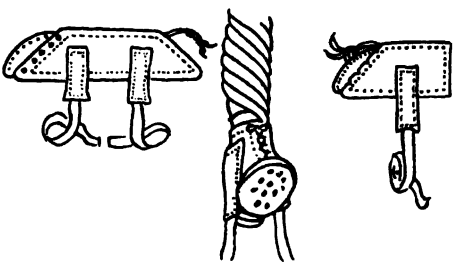
7a Application of the Long Liston Splint



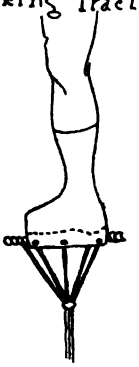
8 Nail Twister or Spanish Windlass



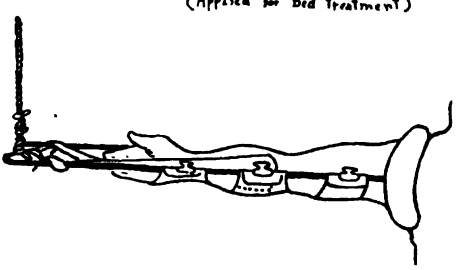
10 Canvass Anklet & Traction Bands



9 Stocking Traction



11 Thomas Traction Arm Splint (Applied for bed treatment)



solution acts like the Carrel-Dakin solution, having as its active agent liquor calcis chlorinatae.

Formula: To 135 c. c. of the liquor calcis chlorinatæ [British Pharmacopœia] add water, 1 liter; add boric acid, 10 grams. Shake

[1] Flavine is a di-amino-acetyl chloride.

well to dissolve. The solution remains clear and ready for use. If the chlorinated liquor calcis is not diluted with water (1 liter) and boric acid is added, a precipitate will develop, which spoils the mixture.

Use in the manner of Dakin technique.

Powdered chlorazene, 1 bottle to 1 gallon distilled sterile water, gives 1 per cent solution of chlorazene, which I find very useful and advantageous in sterilizing the wounds which we have come in contact with to date. It is not so caustic as the Dakin solution and can be used freely, without vaseline prophylaxis, for wound irrigations.

In the hospital on board the U. S. S. *President Lincoln* we are using the Carrel-Dakin fluid as put up in tubes by Johnson & Johnson. This manner of making the fluid is very simple and efficacious.

The caustic properties of the Dakin fluid must not be lightly considered as many bad burns have resulted from overlooking the vaseline prophylaxis. Still I have seen cases where vaseline was used in large amounts and burning take place, due to the susceptibility of the skin to the fluid. In this type of case I advise using: (1) Chlorazene solution; (2) chlorazene paste. Formula: 2 ounces sodium stearate; 1 liter chlorazene solution, ½ per cent.

Very slowly mix the sodium stearate in the chlorazene, stirring it with a ladle for an hour.

The paste has germicidal properties as well as stimulating granulation on large open surfaces, and it does not burn the skin.

3. Dichloramine-T powder and chlorazene oil (5 per cent strength) used as wet dressings for minor surgical wounds, more efficacious than Carrel-Dakin treatment, the latter being reserved for major, deep wounds.

Biological observation.—The temperature and the biological chart are the two factors paramount in closing wounds by secondary suture. Daily observation on the latter show the progress of sterilization, but opinion seems to differ as to when a wound should be closed with reference to the presence of bacteria. Chutro closes when two bacteria are found on an average and the bones are not involved. In the Compiègne battle the same procedure was carried out. Carrel desires his fields absolutely free from bacteria, having counted 20 fields in 3 successive days.

Method of making biological observations:

1. Deep swipe into the tissues of the wound between the fragments of bone if fracture is present.

2. Make smear on glass slide and fix with heat; stain with Loeffler's methylene blue (watery stain) one minute.

3. Use oil immersion and look for bacteria rods, only.

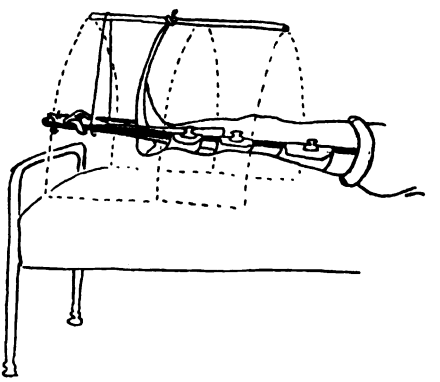
4. Count 20 fields and strike an average.

Begin biological examination on third day after admittance to wards; as a rule on the first day the pus is so plentiful that no bacteria can be found.

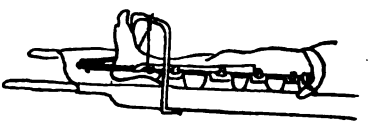
The average amount of rods found on third day is taken as a starting point. Each daily observation is compared to this number, and charted till the average falls from 2 to 0 per 20 fields—at which point the wound is considered sterile.

12 Application of the Jones Humerus Traction Splint

13 Application of the Thomas Traction Leg Splint



14 Hinged Half-Ring Modification of the Thomas Traction Leg Splint.



Immobilization by fixation and traction.—In most fractures it seems that the earlier the permanency of immobilization takes place the more favorable the outlook for good results. This can be accomplished by simply constructed splints and traction material, which may be applied at the first-aid station and not touched till patient arrives at the base for his permanent treatment.

The splints used at Ris Orange were of the following type: (1) Thomas traction arm splint; (2) Jones humerus traction arm splint;

(3) Jones wrist crab splint; (4) Thomas traction leg splint; (5) Keller's modification of Thomas leg splint; (6) Cabot posterior wire splint.

These splints are supplied to the American forces by the Red Cross, and consist of rust-proof iron wire one-fourth to three-eighths inch in diameter, having two lateral rods 6 to 8 inches longer and 1 to 2 inches wider than the limb to which they are to be applied. At distant extremity these rods are continuous and bent in toward the sole of the foot or extremity of hand, forming a curved notch, 6 inches from the most distant point. At the proximate end the lateral rods are united by either a complete or half ring of padded wire, fitting the circumference of the thigh or arm, whichever the case may be.

At Ris Orange and the Pasteur Hospital, if wound was in soft tissue and 1 to 2 bacteria (average) were found to 20 fields, suture could be attempted. If wound was in bony structure, however, the sterilization was continued till freed of bacteria before suture was attempted.

The splints are applied to the injured limb and suspended by pulleys from: (1) Balkan frame; (2) overhead supporting bar, consisting of three-fourths inch pipe or 2-inch wood.

Because of the limited space in the sick bay of the U. S. S. *President Lincoln* we have been able to erect only one quadrilateral frame, made of wood. This seemed so cumbersome that a way was sought to provide overhead suspension of a more simple kind which would yet be applicable to every bunk in the sick bay.

The following plan was adopted, which amply meets the requirements: A single bar of wood holds pulleys leading from the head of the bed to the foot. At the head the bar has a pivot arrangement, which enables the patient to move his leg to any comfortable angle. Traction is instituted in the usual manner. The splint is suspended from pulleys by a stout cord. (See cut, page 545.)

By means of the splints and overhead suspensions one will quickly (1) put the injured parts at physiological rest, (2) insure comfort to the patient, (3) facilitate and hasten the process of repair, (4) prevent unnecessary handling of fracture, (5) keep the fragments in alignment and by means of added traction prevent displacement of the sharp ends of the fractured bones.

Traction material used consisted of (1) adhesive plaster ZO, (2) diachylon plaster, (3) glue, (4) canvas anklets (football type).

The plaster was applied in the usual manner along the lateral and medial aspect of the limb up to point of fracture. This leaves end of plaster fastened to a square piece of wood (buckle), and from this a piece of cord was hung over a pulley at foot of frame, holding a bag of shot.

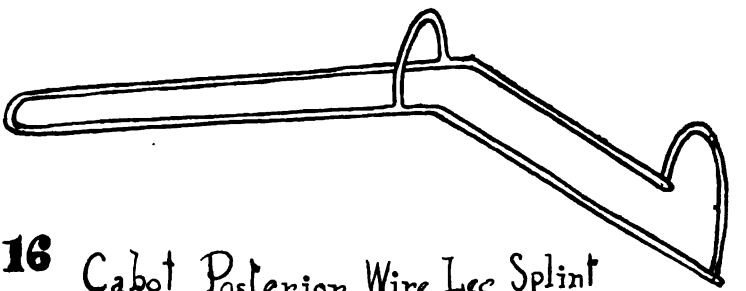
I was much impressed with the glue method of traction, which seemed so simple in the application and yet gave ample means of traction.

Types: Sinclair's glue; Huesner's glue (resin and turpentine).

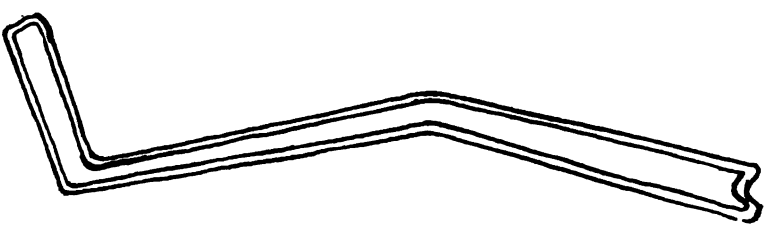
The former must be heated before using. The latter can be used without going through this step.

Resin and turpentine glue: Resin, 50 parts; benzine, pure, 10 parts; alcohol, 90 per cent, 50 parts; Venice turpentine, 1 part.

15 Anterior Thigh and Leg Splint. "Hodgen Type"



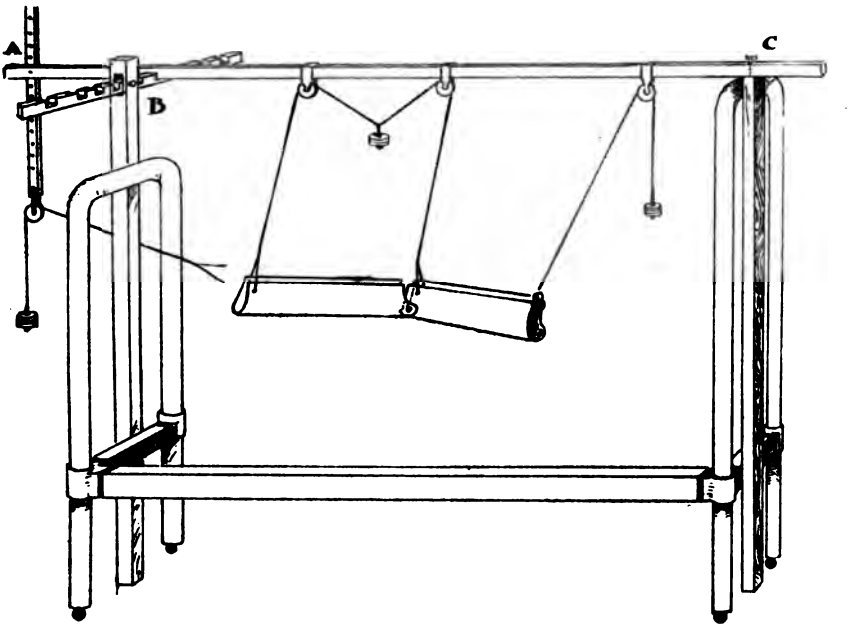
16 Cabot Posterior Wire Leg Splint

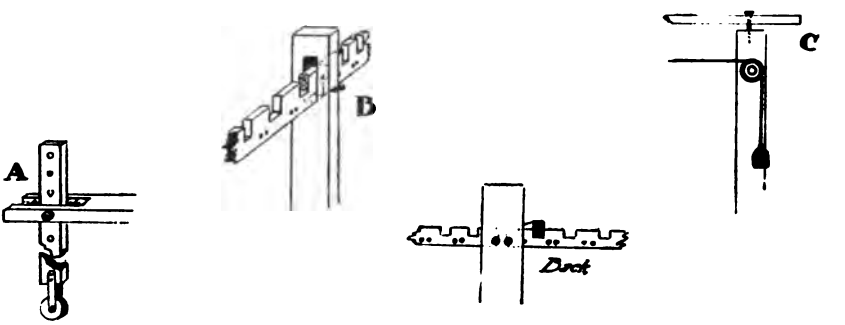


17 Ladder Splint Material

Powder the resin; add one-half alcohol; add Venice turpentine and benzine; wash mixture into a bottle with remaining alcohol and keep well corked. Apply with brush to the leg, painting in opposite direction to hair. Apply flannel or muslin lateral strips to leg (as

you would plaster strips) over the glued surfaces. Press to side of leg and bandage to fix the tractors. Ten minutes after application the weights may be applied to the end of the flannel tractors which are attached to a small piece of wood. From the latter is suspended the cord, holding weight.





At the Hôpital St. Nicholas—10 minutes' walk out of the Gare de Versailles—Dr. Barthe de Sandfort holds his ambrine clinic. While I was there I saw many severe burn cases, second and third degree types, extensive in character; also many cases of trench feet, all undergoing this treatment.

For the past two years I have been using ambrine with varying success. Dr. George Chaffer, of Syracuse, N. Y., attending surgeon

to the Senet Solvay works, employing thousands of workingmen, became interested in this line of treatment, and, together, we worked by this method. Dr. Chaffer agrees with me that it offers the best means of combatting extensive burns, based on an experience of some 200 very bad cases—not to mention hundreds of minor cases so treated.

Dr. de Sandfort has three clinics going at once treating burns, his able assistants carrying on the work in his presence, and, as Carrel has given to the surgical world the technique of using the Dakin fluid, claiming that 80 per cent of the treatment depends upon its proper application, so De Sandfort has given his ambrine treatment for burns and trench feet, and claims that the proper application of it is most essential in effecting a good result.

The treatment of trench foot is essentially the same as for burns only in the early stages, where the feet are swollen, distorted, and painful from exposure to the cold. They are placed in long containers filled with hot liquid and olive oil and held there for 30 to 40 minutes daily. In the out-patient department I saw a half dozen cases of frozen feet treated in this manner, two of whom were having their fourth daily treatment, departing from the hospital as being cured that day. In conversing with the other cases present, I was informed that on the second treatment they felt intense relief from this painful condition, and that after a few more treatments, they, too, expected to be discharged cured.

As ambrine has not hitherto been easily obtainable in the United States, I have been using the following substitute for the past year with good results:

Formula: Beeswax, white, 20 parts; crude petroleum, 5 parts; resin, powdered, 5 parts; paraffin, 70 parts.

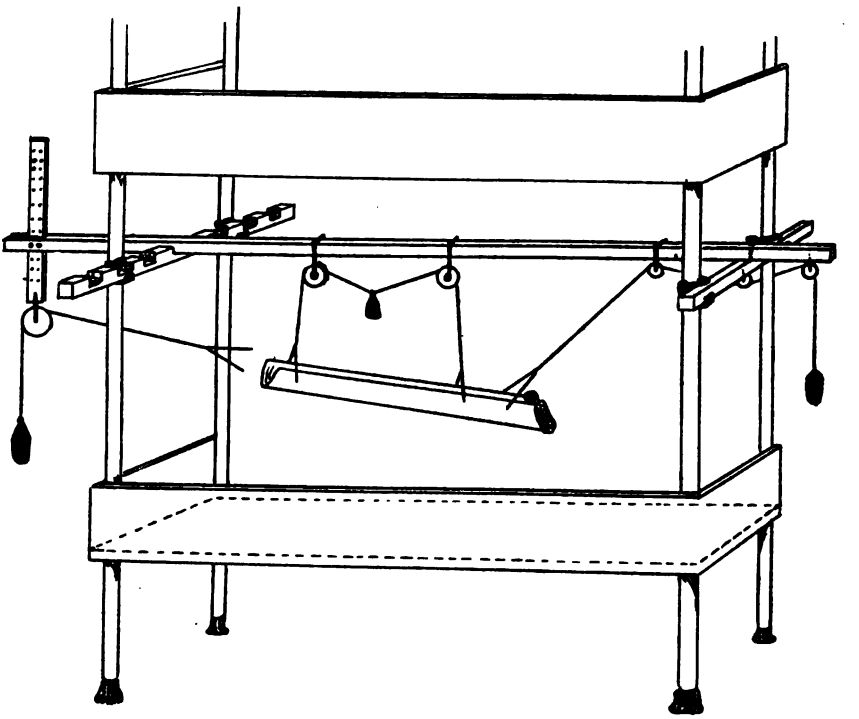
Melt paraffin by heating to 220 F.; add beeswax and resin; add crude petroleum and stir with ladle; boil for 10 minutes. Pour out into small sterile molds and cover with sterile gauze till used.

In the treatment of keloids resulting from burns of marked degree, at this same hospital I witnessed the application of creosote (Beechwood), 1 part in 15 parts of sterile olive oil.

From 10 to 20 minims were injected hypodermically beneath the base of the keloid and gently massaged to disseminate the fluid about the tissues. This is repeated every other day.

Radiographic observation.—It is a well-understood fact that frequent X-ray and fluoroscopic observations are absolutely essential in war surgery, not only in diagnosing fractures and observing the progress of repair, but in localizing foreign bodies, such as shrapnel, bullets, and steel splinters. This procedure involves the use of many plates, and new methods had to be developed in order to meet the conditions as they arise. Mr. Harold Gage has charge of the

X-ray department at Ris Orange. His recent publication on "Simplified X-ray Methods" stamps him as being one of the foremost radiographers developed in the progress of the war. Through his courtesy I viewed many radiograms, plates, and fluoroscopic tracings, showing every manner of fracture in every stage of repair, sequestra, foreign bodies, etc. In order to save plates and the great expense incurred in developing same, Mr. Gage has developed a technique of using celluloid sheets, spread over the fluoroscope



1 piece hard pine 6 feet by 1 inch by ¾ inch (with window at end for bracket bar).
1 piece hard pine 3 feet by 1 inch by ¾ inch (opening for pivot).
1 piece hard pine 3 feet by 1½ inches by ¾ inch (notched every 3 inches).
1 piece hard pine 2 feet by 1 inch by ½ inch (to be inserted in window of support bar).
6 small pulleys—rope.
4 small sand bags.
4 set screws clamp to hold crossbars to bedposts. If not available, ordinary bandages will do.
1 pivot screw for connection with support bar and head crossbar.

screen, and the outline of the fractured bone, sequestra, and foreign body is marked with crayon. Later a tracing from the celluloid sheet is made on tissue paper. This latter tracing is attached to the other charts that follow the wounded man throughout the course of his treatments. It is obvious that this will save considerable expense and time and give ample opportunity to make frequent observations and at the same time be constantly in touch with the progress of repair (osteogenesis). Bromine paper is used to a great extent as a

substitute for plates. In using this type of paper it is advised to use an intensification screen and shorten the spark gap of the tube, more than in ordinary direct radiography. The great value of bromine paper lies in the fact that it produces a good picture, can be stored better, transported a long distance, without danger of breaking and destroying same.

Localization of foreign bodies (Gage).—Heretofore the best methods of localization of foreign bodies depended for the most part upon mathematical calculations, which fact, plus a lot of blind probing into a wound, did not give to the surgeon a method of procedure which was simple and accurate. Gage's method, while not new, is simple and it is accurate. It is simple because it is devoid of mathematical calculations, and accurate because it can not be otherwise if the technique is carefully followed. The appliances necessary to make an observation are as follows: (1) Fluoroscopic apparatus; (2) adjustable compasses having small rings of steel or metal of some sort, attached to the ends of the points, in two or three sizes, that can be adjusted to fit any part of the body; (3) three strips of soft metal which can be molded around the part and removed for tracing purposes; (4) soft marking crayon.

The patient is placed upon his back on the horizontal table, and sandbags placed about the particular part to be examined, in order to be able to slide on the wings of the compass under the part. An anterior-posterior observation is first made, the compass ring is manipulated until the foreign body falls within the circle of steel, the lower compass ring is now moved to coincide with the upper. The foreign body is now observed within the two rings; mark upon the body the exact point of this localization, use red color, anterior-posterior. Rotate the patient in the same plane (sagittal) a few degrees, and follow the above steps, marking the skin with black crayon. Again rotate the patient a few degrees, carry out the observation, and mark with yellow. We have now three observations all marked (anterior-posterior) by means of the soft crayons, red, black, yellow. Using one of the soft, malleable strips, mold same about the plane of observation, and transfer the crayon marks to the metal strip; remove the strip, and re-form upon paper a replica of the contour of the part examined. With a ruler connect the marks, red with red, black to black, etc. Where these lines intersect, the foreign body is located.

Advice given by Capt. C. Leriche, at ———, base hospital, France, in regard to the treatment of fractures and concerning the treatment of injuries to joint surfaces by fragments from shell fire. In many cases of elbow and knee injury, primary subperiosteal resection of a joint is necessary, because, in many hundreds of cases not treated in the above manner infection sooner or later resulted, which not only destroyed the joint and rendered it useless but necessitated

amputation of the affected member. Loss of the joint cartilages also made the above procedure imperative.

Where joint surfaces were not damaged, attempt should always be made at a primary suture of the joint.

Battle fractures are caused by shell splinters for the most part, and not by bullets, as one would expect (always infected, as clothes and dirt are present). Two types of fractures are met with always: (*a*) Fracture due to bullet, resulting in a clean punctured drilling through the bone and soft part; (*b*) fracture due to shell fragments and tumbling bullets, plus the presence of dirt and clothes carried into a ragged, jagged wound of soft part and bone.

When tissues thus traversed by fragments of bullets are filled with blood, the missile causes greater destruction, as it produces an explosive effect beneath the skin and in amongst the muscle and fascia. Example: The vasti, or quadriceps muscle group of the thigh, are much more lacerated by the passage of a steel splinter than skin and bone, and the law of liquids prevails, for the hole in the skin may be merely a puncture, but the muscles above named, and for the reasons given above, will be badly shattered for a very wide area.

Injuries to the bone itself are of two types. There is the contact fracture, where the bullet rests against the bone without penetrating and the penetrating fracture, where the medullary cavity has been punctured by the projectile and soon becomes infected. There is a wide laceration of muscles about the site of injury; also considerable comminution of bone.

When no infection is present, early union of bone and soft parts may be looked for by primary suture.

If infection is present, it rapidly spreads through all the tissues at the point of injury. Agent: Streptococci and bacillus capsulatus aërogenes (Welch).

Gas gangrene develops rapidly, usually killing periosteum and endosteum in the medullary canal, and soon this develops into an open wound in the long bone itself, which eventually becomes the seat of chronic infection, thus preventing union and taking years to effect a cure.

Treatment of contact fractures: (*a*) Prophylaxis of infection; (*b*) change at once (within six hours, if possible) accidental wounds to surgical wounds, by free excision of skin fascia and muscles; (*c*) look carefully along the path where bullet passed, removing every manner of débris; (*d*) do not touch bone unless to cleanse ends, which may have dirt or débris attached to them; (*e*) strive for primary suture after the wound has been thoroughly cleansed by use of tincture of iodine (5 per cent strength); 80 to 90 per cent of such fractures should heal by primary suture if only 6 or 8 hours separate receipt of wound and surgical intervention.

Penetrating fractures are complex in that the bone is now infected. Make no attempt to reset bone. Never remove fragments of bone forcibly. Remove only those fragments which are loose, in order to clean the infected area. Do not touch periosteum. Thoroughly clean skin and muscles with 5 per cent iodine solution. Open site of injury freely. Use Carrel-Dakin solution, striving for secondary closure.

Penetrating fractures demand thorough cleansing for the medullary cavity and ends of the bone; also surrounding parts before attempting secondary closure.

Carrel-Dakin solution, as per technique, is the best method to secure secondary suture.

Dr. Leriche has had large success in elbow, knee, and tarsal joint cases, where good results followed secondary suture of joints.

Summary: Fractures are best treated with splints, modified after the Jones or Thomas type, with elevation in Bradford or Balkan frames.

Early immobilization begins a few minutes after the injury has been received in the front-line trenches, dugouts, or underground hospital.

Early traction also established at the above points and maintained in the transportation of the wounded to the base hospital.

Dr. Leriche lays great emphasis upon early surgical intervention, as the shorter the interval from the time when the patient is injured to the time when he arrives at the base, the more favorable will be the chances of primary suture.

Infection controlled at once by above-quoted method and primary suture resorted to in all cases when the patient arrives within the allotted time (within eight hours).

Base hospitals are equipped especially for this work, having X-ray machine shop, splint equipment machine shop, the Carrel-Dakin apparatus, so that, if necessary, patient can go through his entire convalescence at the first base hospital without being further transported to the rear.

The French have worked for three years on the following system: Chief of staff at base hospital No. 1; assistant chief of staff at base hospital No. 2; other assistants, generally specialists, at base hospital No. 3.

Team play from the trenches to the hospitals, esprit de corps, all along the line, and enthusiasm prevail among the component units of the system.

Four French armies are working under this system:

Base hospital No. 1, at ———, *France.*—Four hundred-bed hospital for treatment of fractures. Dr. Thevonot, chief of staff. Fifteen kilometers from line. Building protected from attack. Several operating rooms, X-ray rooms, laboratories and blacksmith shop.

Patients received within six hours remain until primary union has taken place, then sent to hospital No. 2 at ——— if a big drive is under way at this particular sector of the line, otherwise he can remain until his full convalescence.

Here primary suture of wounds was done in 40 per cent of all cases. Of these 80 per cent were successful. All fractures of the arm and lower leg sutured primarily.

In fracture of the thigh, Dr. Thevonot is not convinced of the advisability of primary suture because of the intense lacerations of muscle tissue. Thigh fractures cleaned up surgically under the Daken-Carrel method were sutured secondarily.

Base hospital No. 2, at ———, Dr. Patel in charge.—Two hundred beds for active cases, 200 beds for convalescents. Same equipment.

It is here that frequent radiographic observations are made on fracture cases. The general run of cases is as follows: (*a*) Old ununited fractures; (*b*) osteomyelitis cases; (*c*) vicious unions; (*d*) comminution fractures.

In the last type of fracture, Dr. Patel wires the comminution with ordinary fisherman's wire.

FORMULA OF SURGICAL DRESSINGS USED IN FRENCH BASE HOSPITALS AND TO BE USED IN THE AMERICAN BASE HOSPITAL.

1. Hypotonic solution for dressing infections of gas bacillus: NACL, .10 parts; distilled water, 1,000 parts.

2. Quinine solution for B. pyocyaneus infections: Quinine hydrocloride, 1 part; NACL, 8.75 parts; distilled water, 1,000 parts.

3. Acetic acid solution for dressings: Acetic acid (glacial), 10 parts; NACL, 8.75 parts; distilled water, 1,000 parts.

(NOTE.—Dilute to one-tenth of 1 per cent of salt if used for continuous irrigation.)

4. Bicarbonate of soda solution for dressings: Sodium bicarbonate, 10 parts; NACL, 8.75 parts; distilled water, 1,000 parts.

5. Physiological salt solution for dressings: NACL, 8.75 parts; distilled water, 1,000 parts.

Hypertonic salt solution for dressings: NACL, 25 parts; distilled water, 1,000 parts.

EUSOL DRESSING (FORMULA).

Take 135 c. c. of the liquor, calcis chlorinatae (B. P.) and dilute with water to 1 liter; add 10 grams of boric acid and shake well till dissolved. The solution should remain clear and ready for use.

If eusol is made in this manner, the 135 c. c. of liquor calcis chlorinatae should be diluted to 750 c. c., and the 250 c. c. of boric solution added. This will prevent the formation of a precipitate which occurs if boric acid is added to the undiluted liquor calcis chlorinatae. By this method of using two stock solutions, eusol can readily be made.

This solution is used chiefly by the British surgeons in progressive sterilization of wounds. In strength of 1–200,000 it has some antiseptic power. It is frequently used for irrigations and wet dressings in 1–1000 to 1–5000 strength.

A ROUTINE MILITARY HOSPITAL TREATMENT FOR SYPHILIS IN FRANCE.

Drugs used: Novarsenobenzol (Billon), cyanide of mercury 1 per cent solution in ampoules of 1 c. c. (dose, 0.01); grey oil, 40 per cent. Local applications to chancre, etc.

First course.

Days.		Gram.	Grams.	Gram.
1	Novarsenobenzol, intravascular	.....	0.30	.....
2	Cyanide of mercury, hypodermic injection	.....	.....	0.01
3	Cyanide of mercury, hypodermic injection	.....	.....	0.01
4	Cyanide of mercury, hypodermic injection	.....	.....	0.01
5	Novarsenobenzol, intravascular	.....	0.45	.....
6	Cyanide of mercury	.....	.....	0.01
7	Cyanide of mercury	.....	.....	0.01
8	Cyanide of mercury	.....	.....	0.01
9	Novarsenobenzol, intravascular	.....	0.60	.....
10	Cyanide of mercury	.....	.....	0.01
11	Cyanide of mercury	.....	.....	0.01
12	Cyanide of mercury	.....	.....	0.01
13	Cyanide of mercury	.....	.....	0.01
14	Novarsenobenzol, intravascular	.....	0.75	.....
15	Cyanide of mercury	.....	.....	0.01
16	Cyanide of mercury	.....	.....	0.01
17	Cyanide of mercury	.....	.....	0.01
18	Cyanide of mercury	.....	.....	0.01
19	Cyanide of mercury	.....	.....	0.01
20	Novarsenobenzol, intravascular	.....	0.90	.....
20	Grey oil	0.10	.....	.....
27	Novarsenobenzol, intravascular	.....	0.90	.....
27	Grey oil	0.10	.....	.....
34	Novarsenobenzol, intravascular	.....	0.90	.....
35	Grey oil	0.10	.....	.....
41	Novarsenobenzol, intravascular	.....	0.90	.....
42	Grey oil	0.10	.....	.....
		0.40	5.70	0.15

Allow 30 days' rest.

Begin second course.

Second course.

Days.		Gram.	Grams.
1	Novarsenobenzol, intravascular	.....	0.45
	Grey oil, intramuscular	0.10	.....
8	Novarsenobenzol, intravascular	.....	0.60
	Grey oil, intramuscular	0.10	.....
15	Novarsenobenzol, intravascular	.....	0.75
	Grey oil, intramuscular	0.10	.....
22	Novarsenobenzol, intravascular	.....	0.90
	Grey oil, intramuscular	0.10	.....
29	Novarsenobenzol, intravascular	.....	0.90
	Grey oil, intramuscular	0.10	.....
		0.50	3.60

After second course, allow two and one-half months' rest. At the end of six months make a Wassermann examination of blood and spinal fluid.

Third course.

Seventh month. Same as course No. 2, regardless of Wassermann.
Three months' rest. Wassermann (end of eleventh month).

Fourth course.

Same as course No. 2 (end of eleventh month).
Four months' rest. Wassermann—if negative, no treatment. If positive, begin treatment with course No. 2.
Four months later. Wassermann—if negative, no treatment. If positive, begin treatment with course No. 2.
Five months later (end of second year). Wassermann—if negative, no treatment. If positive, begin again with course No. 2.

THE RAPID ISOLATION AND TYPING OF MENINGOCOCCUS STRAINS FROM CARRIERS.[1]

By J. E. HOUGHTON and L. L. BULL, Assistant Surgeons, United States Navy.

A modification of the slide agglutination method introduced by Krumweide [2] for the identification of the meningococcus both simplifies and shortens the procedure. The present technique of fishing colonies, inoculating slants of suitable media, growing the organism 12 hours or longer, preparing a standard bacterial suspension, then further incubating the organisms in varying dilutions of monovalent and polyvalent sera for 18 hours at 55 C., has seemed an unduly long and tedious process. It must be mentioned that the agglutinating sera for this method are all used in low dilutions and as some workers have contended that these sera show a "proagglutinoid" reagin or some factor interfering with the reaction, such has not been the case in this work. In connection with agglutination reactions it may be here mentioned that in determination of pneumococcus types the antisera are all used in a comparatively lower dilution than those used in this work. However, checking the slide agglutination method with the macroscopic at 55 C. on a considerable number of strains isolated from both spinal fluids and carriers has proved satisfactory in 100 per cent of tests. (See table.)

The monovalent sera used were prepared by inoculating rabbits with cultures of normal or regular (strain 1) and para (strain 60) obtained from the Rockefeller Institute through the kindness of Dr. P. K. Olitsky. Polyvalent sera furnished by Dr. Simon Flexner and a commercial product were used.

The technique of the test is practically the same as that recommended by Krumweide. Colonies having the lenslike appearance and butyrous consistency and staining characteristics of the meningococcus are emulsified in a drop of 1:10 normal horse serum on a glass slide (1 drop from a 1 mm. capillary pipette). Organisms read-

[1] Reported from the laboratories of the U. S. Naval Medical School, Washington, D. C., and of the Naval Training Station, St. Helena, Norfolk, Va.

[2] Krumweide, C.: Jour. Am. Med. Assn., Aug. 4, 1917, p. 358.

ily emulsifying in the horse serum and showing no agglutination are considered M. catarrhalis or Meningococcus. Those showing agglutination are immediately ruled out as being the M. flavus group, pharyngeus siccus, or one of a number of the pigmented cocci. A 3 mm. loopful of normal-type serum is rubbed into the milky slide-emulsion and should agglutination take place is considered a normal or regular type coccus. Should no clumping appear a loopful of para-type serum is added. Finally the addition of a loopful of polyvalent serum immediately demonstrates white flocculi. Now, if no reaction has been noted with the monovalent sera and definite agglutination occurs with the polyvalent, the organism is considered as being the irregular type. Slight reaction in either one of the two types of sera and complete in the polyvalent are termed "irregular normal" or "irregular para" strains. Clumping is readily seen without the aid of a lens and takes place readily at room temperature, being observed as a curdy coagulation or much like snowflakes. When stained the Gram negative cocci are shown in large clumps, many completely filling the microscopic field. Influenza-like bacilli, so often found along with the meningococcus in confluent plate growths, do not interfere with the reaction and are oftentimes shown scattered between the clumped cocci. The dilutions of antiserum by this method are about 1:10.

Media for cultivation of meningococcus.—Ordinary nutrient agar (beef extract 5, peptone 10, sodium chloride 5, water 1,000, agar 25) having a reaction of plus 0.3 to 0.5 to phenolphthalein or neutral to litmus, to which is added 3 to 5 per cent of defibrinated, laked, or citrated blood (goat, sheep, or human), offers a satisfactory medium for cultivation. Whole-blood media are preferable in that hemolytic organisms are immediately eliminated. Growth is rapid and luxuriant after 16 to 18 hours' incubation at 37 C., the colonies appearing from 0.5 to 2 or more millimeters in size. The preparation of more complex and difficultly prepared media, as veal infusion, the so-called harmone agar, and the addition of dextrose seems not only an unnecessary procedure, but inadvisable from an economical standpoint at least. The first consideration is the time and expense involved in preparing meat infusion; secondly, the addition of dextrose to the media offers a substance which rapidly undergoes acid formation and tends to cause rapid destruction of this fragile microorganism.

Rapid death of the culture has long been recognized as being due to acid production.[1] It is of course admitted that dextrose does to a slight degree enhance the early growth, but the point to be brought to notice is the prevalence of acid-forming bacteria in the mouth and nasopharynx, which exert an inhibitory reaction on meningococcus on sugar media due to the acid produced. It must be con-

[1] Hiss and Zinsser: Textbook of Bacteriology, 1915.

sidered the acid formation of the salivary organisms, rather than the action of saliva, which is said to exert an inhibitory action.[1] Swabs from a number of carriers planted on dextrose-free blood agar plates yielded numerous colonies of meningococcus in large zones of hemolysis due to a hemolytic streptococcus and pneumococcus, the growth being seemingly unimpaired. Inoculation from the same carriers of swabs taken in the same manner on blood agar media containing from 0.5 per cent to 2 per cent dextrose demonstrated only a few scattered colonies, isolated from the hemolytic areas. For stock transplants and cultures the starch medium of Vedder is very satisfactory.

The cumbersome West swab[2] was discarded as being impractical for field use, difficult to properly prepare, and easily broken. The most convenient form of swab is an 8-inch length of galvanized-iron wire tipped with cotton,[3] with the last inch and a quarter bent through an angle of 30 to 40 degrees. These are put up in bundles of 24 each, wrapped in muslin and sterilized. With a little practice they are easily passed under the arch of the palate at either side of the uvula, during phonation, the patient saying "Ah!" The swab having been taken it is sown without delay on a spot near the edge of the blood-agar plate and distributed with a bent glass rod, which is easily sterilized by placing in alcohol and passing through flame, or with platinum or Nichrome wire loop.

From an examination of several thousand cultures and a trial of the various methods and media, the foregoing has been adopted as the most simple and expeditious procedure in the isolation and identification of the meningococcus.

[1] Gordon, Flack, and others: Report of Research Committee on Meningitis, Great Britain, 1917.
[2] Foster and Gaskell: Cerebro-spinal Fever, 1916, p. 134.
[3] Stitt: Practical Bacteriology, Parasitology, and Blood Work 1918.

Comparison of macroscopic (55 C.) and slide agglutination.

Coccus.	Macroscopic 55 C.—18 hours.															Slide method.				
	Normal horse.	Normal type serum 1.					Para-type serum 60.					Polyvalent sera R. I. M. S.				Normal horse.	Normal (1).	Para (60).	Polyvalent.	Remarks.
	1-50.	50.	100.	200.	400.	800.	50.	100.	200.	400.	800.	100.	200.	400.	800.	1-10.				
1...	−	+	+	+	+	±	±	−	−	−	−	+	+	+	+	−	+	−	+	
2...	+	−	−	−	−	−	−	−	−	−	−	+	+	±	−	+	−	−	+	M. flavus.
3...	−	+	+	+	−	−	−	−	−	−	−	+	+	+	±	−	+	−	+	
4...	−	+	+	+	+	−	+	+	−	−	−	+	+	+	+	−	+	−	+	
5...	−	+	+	+	+	−	±	−	−	−	−	+	+	+	−	−	+	−	+	
6...	−	+	+	+	±	−	−	−	−	−	−	+	+	+	±	−	+	−	+	
7...	−	+	+	±	−	−	+	+	+	±	−	+	+	+	+	−	+	+	+	
8...	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	M. catarrhalis.
9...	−	+	−	−	−	−	+	+	+	+	±	+	+	+	+	−	−	+	+	
10...	+	−	−	−	−	−	−	−	−	−	−	+	+	±	−	+	−	−	+	M. flavus.
11...	−	+	+	+	+	−	+	−	−	−	−	+	+	+	−	−	+	−	+	
12...	−	+	+	+	+	±	+	±	−	−	−	+	+	+	±	−	+	−	+	
13...	−	−	−	−	−	−	+	+	+	−	−	+	+	+	−	−	−	+	+	
14...	−	+	−	−	−	−	+	+	±	−	−	+	+	+	+	−	−	±	+	
15...	−	+	−	−	−	−	+	+	+	±	−	+	+	+	±	−	−	+	+	
16...	−	+	+	+	+	−	+	−	−	−	−	+	+	+	+	−	+	−	+	
17...	−	+	+	+	−	−	+	±	−	−	−	+	+	±	−	−	+	−	+	
18...	−	+	+	+	+	+	±	−	−	−	−	+	+	+	+	−	+	−	+	
19...	−	±	−	−	−	−	+	+	+	+	±	+	+	±	−	−	−	+	+	
20...	−	+	+	+	±	−	+	−	−	−	−	+	+	+	+	−	+	−	+	
21...	−	+	+	+	+	±	±	−	−	−	−	+	+	+	−	−	+	−	+	
22...	−	+	−	−	−	−	+	+	+	±	−	+	+	+	−	−	−	+	+	
23...	−	+	+	+	±	−	±	−	−	−	−	+	+	+	±	−	+	−	+	
24...	+	−	−	−	−	−	−	−	−	−	−	+	±	±	−	+	−	−	+	Do.
25...	−	+	+	+	−	−	+	+	+	+	±	+	+	+	−	−	±	+	+	
26...	−	+	+	+	+	−	±	−	−	−	−	+	+	+	−	−	+	−	+	
27...	−	+	+	+	−	−	−	−	−	−	−	+	+	+	+	−	+	−	+	
28...	−	±	−	−	−	−	+	+	+	−	−	+	+	+	±	−	−	+	+	
29...	−	+	+	±	−	−	−	−	−	−	−	+	+	−	−	−	+	−	+	
30...	−	+	+	+	±	−	±	−	−	−	−	+	+	+	+	−	+	−	+	

ABSTRACT OF MEDICAL AND SURGICAL CONFERENCE.

At one of the recent bimonthly meetings for medical officers of the hospital and navy yard, Mare Island, Cal., Passed Assistant Surgeon C. F. Charlton, United States Naval Reserve Force, reviewed the statistics of venereal disease in the Navy and quoted statistics for New York City. He concluded his paper by emphasizing the medical officer's duty at this juncture, not only to keep men fit for duty, but, as far as possible, to keep them on duty while receiving treatment. "Generally speaking, our business is not 'as usual,' for we are now trying to maintain the greatest number effective instead of trying to cure them, and in venereal disease there is not complete coincidence of these two objectives."

Assistant Surgeon R. E. Kriz, United States Navy, read a paper entitled:

ULTRA-VIOLET AND SOLAR RAY THERAPY.

After references to Rollier and the marvelous results he has obtained in the treatment of tuberculosis by solar rays, he says:

"The local effect of the ultraviolet rays are quite analagous to the natural sun rays. They produce a dermatitis or sunburn of a greater or lesser severity governed by the length of the exposure, which does not tend to produce scarring. They may be said to be germicidal, soothing and antipruritic, stimulative and constructive, or caustic and destructive, depending on the length of the exposure, the distance from the light, and the amount of ray generated. We may also speak of them as superficial or deep, depending on the pressure produced on the parts exposed.

"Therefore, in the treatment of disease, especially those of the skin, the above properties and those which I will speak of later must be kept in mind.

"What the exact function of the pigment is and what relation it has to skin diseases, I am free to confess I do not know. However, it is a well-recognized fact that the dark-skinned people in the native state have few skin infections. Rollier found that blonds who would not tan under the actinic ray treatment would not improve. This, therefore, shows a relationship between pigmentation, the ultraviolet ray, and diseases of the skin which is yet to be explained physiologically.

"General conditions which must be kept in mind in the treatment of different cases are as follows:

1. Dark people stand more light than individuals of lighter complexion; brunettes more than blonds.

2. Persons who tan easily when exposed stand more than those who blister readily.

3. A congested skin has more toleration than normal skin. Hence the precaution of protecting the normal skin in treatment.

4. A thick skin, especially one which rests upon a large amount of fat, stands more light than a thin, dry skin.

5. A tough skin stands more than a sensitive skin.

6. A pigmented skin requires more than one free from pigment.

7. Certain parts of the body—for example, the palms and the dorsum of the hands and corresponding parts of the feet and face—require more light than those parts covered by clothing.

8. The head and other parts covered by hair stand more than parts not covered by hair.

9. The genitalia stand the ray in moderate doses.

10. Mucous membranes stand the light in fair doses.

11. In acute conditions the treatment should be conducted once every second or third day. Treatment should never be more than eight days apart. A chronic condition is best treated daily.

INDICATIONS IN SURGERY: ADJUVANT.

1. Surgical tuberculosis.
2. Fistulae of all kinds.
3. Badly healing sores.
4. Ulcers of all types (cutaneous).
5. Festering wounds.
6. Furunculosis.
7. Nevi.

INDICATIONS IN INTERNAL MEDICINE.

1. Disturbances in metabolism, such as chlorosis, anemia and high blood pressure.
2. Tuberculosis of the lungs.

INDICATIONS IN GYNECOLOGY.

1. Bleeding uterine myomata.
2. Gonorrhea.
3. Metrorrhagia.

"Its most efficient place is, however, in dermatology, and here it is the most efficient and far-reaching therapeutic agent in the armamentarium of dermatology, and surely its application is more pleasing to the patient than salves and lotions, etc.

"It is to be remembered that the technic of radiation must be in line with the desired result in view. It is practically impossible to formulate a universal rule for its applications. The technic in general which we use is as follows: The normal skin around the lesions is protected as far as possible. The first exposure being given at a distance of 40 inches. In acute cases from one to two minutes, in chronic conditions from three to six minutes. In the succeeding sittings increase the time three minutes until the time reaches 15 minutes, then decrease the distance 3 inches at each sitting until a distance of 18 inches is reached at which sitting you keep until the case is dismissed. We have never had a condition which needed this amount of raying.

"The conditions in which the ultra-violet ray is considered a specific are as follows:

1. Lupus vulgaris.
2. Lupus erythematosus.
3. Sycosis vulgaris.
4. Tenia sycosis.
5. Seborrhea dermatitis.
6. Alopecia areata.
7. Pityriasis rosea.
8. Pityriasis versicolor.
9. Trichophytosis.

"It is adjuvant and clears up the following:

1. Chronic eczema.
2. Pruritis.
3. Acne and acne vulgaris.
4. Furunculosis.
5. Decalvans.
6. Psoriasis.
7. Acne rosacea.
8. Obstinate syphilitic swellings (with specific treatment).
9. Vitiligo (temporarily).
10. Premature baldness.
11. Chancroidal ulcers.
12. Dermatitis venenata.

CASES TREATED.

"We wish to apologize for not giving a very elaborate history, however, we believe that the history would be of little value and only take up unnecessary space.

"Three cases of tenia sycosis, one case of which refused to improve under the ordinary treatment, all of which were cured after six radiations each.

"Five cases of tenia vulgaris, 1 case cured in 14 days, 3 in 18 days, and 1 in 21 days.

"Five cases of pityriasis rosea were cured after three radiations each.

"Four cases of pityriasis versicolor were cured after two radiations each.

"Nine cases of leg ulcers due to different types of infection which failed to heal under the regular treatment, all of which were cured in from 5 to 21 days.

"One case of scabies which would not completely clear up with the sulphur treatment, cleared up on the second exposure.

"Five cases of psoriasis, two of which were of the acute type, cleared up with four treatments each. Two cases of two years' standing cleared up with six treatments each, and one case of five years' standing which was practically general cleared up with 10 exposures.

"Four cases of seborrhea of the bearded area who have had three treatments each were much improved.

"Seven cases of seborrhea dermatitis were cured in one treatment each.

"One case of suppurating tubercular glands of the neck stopped suppurating after the fourth treatment.

"Four cases of chronic eczema, two of four years' standing and two of two years' standing cleared up after five treatments.

"Two cases of dhobie itch (ringworm fungus) cured after three treatments each.

"One case of intertrigo with secondary eczema which was treated for five months by ordinary methods and continually getting worse, was cured in 10 days.

"One case of chancroidal ulcer of the thigh which was treated by the ordinary procedure for eight weeks without improvement. This ulcer was circular with a diameter of 3 inches. This was completely cured in 14 days.

"Three cases of dermatitis venenata (poison oak) were cured in three treatments each. So far as we know we are the first to report cured in this condition. Here we have applied a special technic which we will report later after working up a larger series of cases, if we find that they respond as well as the above."

Medical Inspector J. S. WOODWARD, United States Navy, read a paper entitled—

PURPURA HEMORRHAGICA,

from which the following is extracted.

"It is supposed that purpura is dependent upon some substance—toxin, bacteria, drugs, etc.—which destroys the platelets and leaves the red cells less resistent. To this may be added another factor, an aplasia of the blood platelet forming elements of the marrow. Among the chief diseases and conditions which appear to influence its origin are scurvy, acute infectious diseases (measles is given prominently among this type), septicemia, certain malignancies, nerve affections, certain drugs, iodides, belladona, mercury, turpentine, and snake venom.

"The case which gives us a reason for this paper is one that presents many features of purpura due to infection. I am of the opinion that the infection was solely responsible and that the type simulated closely a purpura abdominalis. The patient was originally admitted with measles. After a short period in the measles ward, he started to bleed from both nostrils and had profuse hemorrhage. Packs were resorted to with fair success, but a marked anemia was the result.

Later he was transferred to a ward, with a complicating otitis and hemorrhage from the left ear. There were purpuric areas in front of the left ear, behind the left ear and on the lips, and several spots on the face, all of which oozed or bled with little or no provocation. Due to the fact that a streptococci infection was found in the ear and that a focus of absorption was deemed responsible for the tendency to hemorrhage, a mastoid was performed disclosing a hemorrhagic condition of the deeper tissues, the cells of both the tip and the zigomatic base. The sinus itself was not thrombosed. Bleeding was continuous throughout the operation. The blood was then pale in color, but with no appreciable increase of clot time. A firm pale clot was rapidly formed. Prior to operation, patient had had two administrations of antidiphtheritic serum. After operation, he was placed upon 15-grain doses of calcium chloride and salicylates were continued. The areas under this treatment rapidly cleared. There was no further bleeding from the bowel, kidneys, or from the former bleeding surfaces. I might add here that he had two one-half dram doses of ergot, which apparently had some controlling affect. Death five days after operation.

"At the autopsy, two large hemorrhages into the mesentery were found in the abdomen. There were petechial hemorrhages into the heart muscle itself. The lateral sinus was found thrombosed and a septic pneumonia. I do not believe that we benefited his condition by an operation. The symptoms of continued bleeding from the bowel, the hemorrhages found post-mortem, and the cutaneous hemorrhage would lead me to accept this as a type of purpura abdominalis, and together with the above points in common, there was an involvement of the left wrist for several days prior to death.

"I believe that the otitis had no more than an intensifying influence on the termination. Measles was the prime factor.

"In septicemia, or the so-called septicopyemia, gastrointestinal symptoms are principally gastroenteritis, with vomiting, frequent serous discharge, and a diarrhea of mild intensity—septic diarrhea. The hemorrhages are punctiform in character into the skin itself, with occasional and more extensive ecchymosis, scarlatinal eruptions also present, but these are less characteristic. As far as I am able to ascertain in the literature, there is no direct hemorrhage from the skin or mucous membranes due solely to a septic infection. Renal symptoms are those of septic nephritis; albumen, tube casts, red and white corpuscles, but no distinct hemorrhage. Virulent attacks terminate within 48 hours. The mildest type may terminate favorably, but this is rare. The effects are not dependent upon the dose of infection but upon the virulence of the organisms."

Medical Inspector J. S. WOODWARD, United States Navy, read the following paper:

A CÆCAL VENT FOR RELIEF OF PARALYTIC ILEUS AND POST-OPERATIVE GASSING.[1]

In the post-operative treatment of intestinal lesions, varying from obstruction to acute peritonitis, resections, and anastomosis, we have found that the simple procedure of a colostomy and insertion of a small catheter has practically eliminated the distressing gassing so constant in these cases.

The technique used here has been entirely satisfactory and there seems to be no contra indication. After whatever surgical procedure required has been performed, with a No. 0 chromic gut suture a purse-string suture is implanted in the cæcum 1 or 2 inches from the caput coli; a perforation in the center of this admits a No. 10 or 12 soft rubber catheter, implanted about 2 inches into the lumen of the bowel; tighten the purse string about the catheter and invaginate; another purse string reinforces the first; secure the catheter by a single stitch through the lateral wall—a small stab of the abdominal wall gives egress to the catheter. Here it is secured by a single suture, silk-worm gut or horsehair; the gut is held closely to the peritoneum by the catheter and outside fixation, or in case of other drainage is led out through the original incision, no especial attempt being made to approximate the gut and peritoneum.

Retention is obtained as long as desired by increasing the strength of the suture material. In our cases the catheter is removed from the fifth to seventh day, with the skin suture; there has been no complication. Closure of both bowel and skin wound is rapid.

Post-operative convalescence is easy and comfortable. Morphine, one-eighth to one-sixth grain, the day of operation is all that has been required. Except for the usual ether vomiting, which is lessened, nausea has not been present. Gastric lavage for dilation and hiccough have been unnecessary. The drainage of gas and fluid fecal content does away with gas enemata and other medication. A dressing about the tube or leading into a bedside receptacle cares for the drainage. In addition to these advantages, fluid in the form of drips or nutrient enemata are administered and the flushing of the entire large bowel as often as desirable through the catheter eliminates a large amount of toxic material. The size of the catheter can be increased or lessened and has a distinct advantage in our opinion over the large tubes and open end drainage of numerous other methods.

In a recent series of 10 cases this method has given entire satisfaction, with so much comfort to the patient and so little worry to the

[1] Since this paper was read six more cases treated with satisfactory results have been recorded.

attendants one is almost inclined to use it as a routine in abdominal work. Appended is a summary of 10 cases in which venting has been used in this hospital:

J. R. W. Corporal, Marine Corps. Chronic dysentery, amebic; appendicostomy for irrigation; tube placed in appendix. Convalescence uneventful. Dysentery cured.

E. N. B. Printer, United States Navy. Age, 31. White; male. Ventral hernia, post-operative. Patient had previously been operated for gall-bladder drainage, with resulting hernia in scar. During manipulation and freeing of adhesions a loop of ileum was practically severed. A lateral anastomosis was performed, the hernial condition repaired, cæcum vented, and wound closed without drainage. Recovery uneventful.

G. Ensign, United States Navy. Age, 27 Carcinoma at splenic flexure; a short circuiting (ileum to descending colon). Sypmtoms peritonitis on fifth day; marked distention, vomiting, temperature 102°, shock. Drainage of both iliac fossæ and cæcostomy. Easy convalescence, no gassing or distention. Continuous drip through catheter in cæcum.

J. H. M. Machinist's mate, second class, United States Navy. Age, 29. Chronic constipation. Ileo-colostomy. Cæcum vented. No complications. Convalescence uneventful.

R. E. H. Fireman, second class, United States Navy. Age, 22. Diagnosis undetermined. Operated on admission. Belly tension. Upper right quadrant tender. Vomiting; bile-stained fluid; no fecal odor. Marked distention. Preoperative diagnosis; perforated duodenal ulcer. Entrance through right rectus high. Mass of omentum containing pus in center; resected exposing an abscess beneath right lobe of liver, in the pus of which a formed fecal concretion was found, which had escaped from the perforated tip of a long retro-cæcal appendix. Appendectomy, tube drainage, and cæcum vented. Mild shock; no gassing or distention. Uneventful convalescence. Cæcostomy tube disappeared on fifth day and was followed through the large bowel by X-ray; passed on third day.

G. H. Hospital apprentice, first class, United States Navy. Age, 20. Acute appendicitis. Appendical abscess. Appendectomy, drainage; cæcum vented. Uneventful convalescence.

W. B. K. Musician, first class, United States Navy. Age, 33. Intestinal obstruction. Post-operative. Belly generally tender; distended. Vomiting, bile-stained fluid; fecal odor. Marked pain at operation; an adhesion of ileum to left abdominal wall, across which there was a complete twist of the bowel above the adhesion on its mesentery; adhesion freed; bowel and mesentery returned to normal position. Cæcum vented. Convalescence uneventful, except for an ether pneumonia, which terminated favorably by resolution.

J. E. F. Pharmacist's mate, United States Navy. Age, 24. Acute appendicitis. Abscess from perforation. Appendectomy; drainage. Cæcum vented. Convalescence uneventful.

T. E. C. Hospital apprentice, first class, United States Navy. Appendicitis, acute. Perforated appendix. Peritonitis. Appendectomy; tube drainage; Cæcum vented. Convalescence uncomplicated.

J. N. F. Chief water tender, United States Navy. Age, 59. Gall stones. Impacted stone in ampulla of Vater. Removed through transduodenal incision. Gall-bladder drainage. Cæcum vented. Convalescence uneventful.

THE PHYSICAL EXAMINATION OF MORE THAN 8,000 APPLICANTS FOR THE UNITED STATES NAVY.

By J. A. B. Sinclair, Acting Assistant Surgeon, United States Navy, and G. B. Story, Passed Assistant Surgeon, United States Naval Reserve Force.

During the period from October 1, 1916, to December 31, 1917, over 8,500 applicants for service in the United States Navy were examined by the medical officers on duty at the Portland, Oreg., recruiting station, with the following results:

Total applicants	8,500
Total enlisted	5,385
Examined by medical officer	8,500
Rejected by medical officer	3,115
Per cent of rejections	36.6

PRINCIPAL CAUSES OF REJECTIONS.

Deformities:		Hernia inguinal, not operated	140
Marked spinal curvature	152	Hernia umbilical, not operated	3
Deformity of chest	7	Hernia femoral	3
Deformity of fingers	8	Hernia incisional	5
Deformity of elbow	12	Intermittent pulse	11
Genu valgum	8	Aneurism (aortic arch)	1
Genu varum	5	Mental diseases	21
Hallux valgus	16	Deflected nasal septum	7
Hammer toes	23	Nasal spurs	5
Pes cavus	3	Hypertrophy of turbinated bones	24
Deformity of arm	2	Skin diseases	24
Deformity of forearm	4	Defective teeth	94
Deformity of legs	6	Pyorrhea	47
Deformity of thigh	3	Tuberculosis and tubercular suspects	51
Deformity of jaw	5	Tuberculosis of bone	6
Ingrowing toenails	13	Varicocele (medium and large) symptoms	91
Harelip	3	Varicose veins	26
Ear:		Blenorrhea	37
Defective hearing	84	Syphilis	12
Other auditory diseases	16	Hypospadias	9
Eye:		Phimosis	14
Color blindness	170	Loss both testicles	3
Defective refraction	386	Testicles partially descended in canal	9
Corneal opacity following ulcer	4	Atrophy, both testicles	1
Corneal ulcer	2	Hydrocele	12
Ptosis	5	Chronic appendicitis	7
Conjunctivitis	5	Goiter with symptoms	12
Strabismus	7	Malingering	4
Iritis	2	Enlarged tonsils	13
Ectropion	1	Defective speech	5
Congenital cataract	1	Rheumatism	6
Flat feet	82	Colitis	2
Weak feet, not flat	21	Facial paralysis	2
Heart affections (organic)	354		
Tachycardia	6		
Bradycardia	2		

Chicken-pox	1	Disfiguring birthmarks	6
Measles	1	Enlarged cervical gland	18
Asthma	4	Stricture urethra	3
Gastric ulcer	2	No evidence citizenship	16
Intestinal adhesions	4	Undesirable	40
Fistula in ano	14	Under age	49
Hemorrhoids	26	Under height	42
Nephritis	8	Under weight	210
Chronic pleurisy	4	Poor physique	72
Thoracotomy	7	Obscene tattooing	6
Muscular atrophy	3		

During the period considered the per cent of rejections was materially decreased by the following factors:

First.—In April and May, 1917, a large number of young men, students in the various high schools, colleges, and universities of the Northwest, many of whom were athletes in training, presented themselves for examination. These applicants were physically and mentally far superior to the average recruit. In one group of over 30 men from one of our colleges there was not a single rejection.

Second.—Elimination of the grossly unfit by enlisted men in charge of substations and traveling parties. In our opinion, however, good men are lost by such an arrangement, and many recruits were saved by instructions to substations to keep in touch with each and every case which was in any way doubtful, until the station was visited by the medical officer.

Third.—Patriotic services rendered by local dentists. A number of applicants with insufficient number of sound and also with defective teeth complicated by pyorrhea and gingivitis were cared for without cost to the applicants and thus reclaimed for service.

Fourth.—Like services were rendered by local specialists for the correction of eye, ear, nose, and throat conditions which were causes for rejection. Specialists also rendered opinions on skin affections. X-ray examinations were made for us to eliminate possible tuberculosis in light-weight applicants.

Fifth.—Surgical operations were performed upon applicants, temporarily rejected for hernia (inguinal, umbilical, femoral, and incisional), hydrocele, varicocele, varicose veins, phimosis, undescended testicles, amputations of ankylosed fingers, hammer toes, fistulæ, and hemorrhoids. These operations were performed in a large part by the examining surgeons, and also by certain patriotic local surgeons without charge to the applicants. The greater part of the hospital expenses involved were sustained by patriotic citizens of Portland, Oreg., and Spokane, Wash. The Sacred Heart Hospital made arrangements by which the men could easily send back money for their hospital expenses after going into the service.

Sixth. Cases were also saved to the service by giving a list of instructions to applicants who were under weight and in need of routine hygiene, a large number of such cases returning to be accepted after having attained the standard requirements by following the instructions given.

Seventh. Cooperation with the physical directors of the local athletic organizations made it possible for a number of young applicants presenting themselves with moderate spinal curvatures to be accepted, after having taken an appropriate course of physical exercise.

As the result of these services over 400 men who were temporarily rejected were made fit for service.

Among the conditions encountered which were at first confusing we noted:

Defective hearing.—Most of these cases gave a history of otitis media, scarlet fever, or tonsillitis, while a few gave a history of trauma. Two cases having undergone mastoid operations had practically normal hearing. A number of applicants whose hearing was defective on first test, showed normal hearing after cerumen was removed. The whisper test alone was used in all cases.

During the examination of hearts, on inspection, our attention was repeatedly attracted to a line of dilated skin venules, from half inch to 1 inch in breadth, extending along the right costal border, across the ensiform cartilage, and thence along the left costal border. This condition was so frequently associated with an apex beat displaced to the left and below the normal position and with organic cardiac murmurs, that we believe that it is a point which may prove to be of some clinical significance in suspecting abnormal cardiac conditions. We have been unable to explain this condition, and suggest that possibly it may be due to mechanical causes, such as abnormal cardiac impulse against the chest wall and local interference with venous circulation.

Practically all of the cases of organic heart lesions gave a history of either rheumatism, tonsillitis, pyorrhea, diphtheria, pneumonia, scarlet fever, or typhoid fever, and roughly in about the order here given. These cases invariably showed more or less cardiac enlargement, and yet in not a single case was there any evidence of failing compensation, though the majority of applicants discovered with this condition were under weight. Blood pressure findings in these cases were frequently normal.

A diagnosis of "athlete's heart" was made in a number of cases, this condition occurring most frequently in men employed in indoor occupations such as bank clerks, who had engaged spasmodically in competitive athletics like handball, squash, football, rowing, etc.,

many of the heart lesions in these men being associated with more or less anemia.

The influence of sudden change of altitude was often noted. Men who came from elevations as high as 4,000 feet to practically sea level in a few hours, which was quite frequent, showed such marked temporary disturbance of circulation that it was necessary to continue our observations for a few days in order to allow adjustment to new conditions to take place.

Remarkably few cases of syncope occurred during the physical examination. Undoubtedly the majority occurred from psychic influences, as they occurred in groups, two or three fainting at the same time.

One case of aneurism of the arch of the aorta was discovered, the findings being confirmed by X-ray.

Functional murmurs.—This condition offered the most difficult problem in the examination of recruits. Several years ago the Bureau of Medicine and Surgery issued instructions that great care should be exercised in the differential diagnosis between functional and organic murmurs, and further that true functional murmurs should not be rejected. We are in possession of abundant evidence that this advice was timely and wise. Functional murmurs are most commonly audible over the pulmonic valve area, next at mitral, next aortic valve areas. In other words, they are nearly always at the base, always systolic in time, faint and blowing in quality, and not transmitted beyond the præcordia. They are not constant and frequently disappear in a few days, while an organic murmur is constant. Of course, there is no characteristic change of pulse with functional murmurs, as there is at times with organic ones. Nevertheless, the two varieties are hard to differentiate and a conclusion can sometimes be reached only after repeated examinations, which have resulted in quite different decisions. We repeat that to us the proper placing of functional murmurs has been quite the hardest thing for us in the physical examination of recruits, excepting possibly, the detection of beginning tuberculosis. The X-ray has been made use of to some extent to eliminate tuberculous lesions, but we do not feel that our experience in this matter has been sufficient to report upon.

Bunions.—A number of cases of bunions have been operated upon, the Fowler operation being selected and our results have been most satisfactory. All cases operated upon by the examining surgeons have been accepted.

In arriving at conclusions regarding flat, weak, painful and deformed feet no single test was relied upon. Prints, measurements, running, and jumping tests were all employed and we believe that

by giving due consideration to all these methods of diagnosis men have been proven to have strong serviceable feet, who at first inspection showed apparently weak and flat feet.

Cases showing slight enlargement of the thyroid without symptoms in men especially fit for service, and free from other defects, were accepted, proper note being made in their health record. In only one case of thyroid enlargement was exopthalmos present.

Patience in determining the presence or absence of defective color sense proved valuable, and our relatively low percentage of rejections for color blindness is probably attributable to this. The error of too quickly dismissing a man who has placed skeins wrongly soon became evident to us, and instruction circulars sent by us to postmasters and physicians in the smaller towns advised against the employment of the test by them.

It is suggested that all examiners adopt a *system* of examination, a regularly repeated routine, one which takes cognizance of the whole applicant in serial order of his parts.

This prevents unnecessary repetition and the unintentional overlooking of any part of the examination. This routine should start in the reception room and end in the recruiting officer's room with the swearing in of the man.

We believe the hearing test would be simplified by the employment of the whispered voice only, the man looking directly away from the examiner and an assistant stopping the ear not under examination. The ticks of different watches vary much in loudness, and the close proximity of the examiner helps the man to guess where the watch is.

In the "Hints for the Inexperienced in Naval and Marine Corps Recruiting" the print test is mentioned, though not praised. In our opinion it should be discarded. It has not been used in this office for several years; but before putting it aside we noted that feet which by actual measurement of the distance between the tubercle of the scaphoid and the line from lower border of the internal malleolus to the lower tubercle on head of the first metatarsal showed one-half inch or less were sometimes flat when judged by the print test, and conversely some feet which failed to make flat prints showed three-fourths inch and more between the aforesaid point and line, while still others were encountered which were actually *weak* as shown by the running and jumping test, with a distinct limp and admission of painful (Morton's) third toe and heel pain, but which were not flat by either print or measurement. Too many good men have been lost from "flat foot."

Most of the Siwash Indians and most Negroes and Filipinos are flat-footed, but no one who has undertaken to follow a Siwash up mountain trails would accuse him of the possession of weak feet. They, like many white men who went barefoot when boys and whose

fathers and grandfathers did likewise, have bulky plantar muscles and fatty pads underneath them.

The number of men who have been surveyed for "pes planus" has been greatly enhanced by their desire to get out. (Do not let the examined hear you say much about flat feet.)

A recruiting officer (Medical Corps or Line) feels no particular qualms of regret when an applicant is found upon examination to have multiple causes for rejection, but on the other hand a most disappointing feature of recruiting duty is the necessity for rejecting otherwise good men for single causes.

The question then arises; Can this disappointment be modified or eliminated? It can be modified, and many men can be saved to the service. It is essential that the medical officer have a heart in his work. If a would-be recruit is summarily dismissed without v uchsafing him an explanation of his rejection, he usually leaves sans cheer and sans any particular tendency to overcome his defect and return for another examination. In our experience lads who at 17 to 20 years of age were underweight or undeveloped or had spinal curvatures have come back in from six months to three years and been accepted. We know how readily a boy's physique is improved at the naval training stations, and we have a number of times been able to accept men who six months before were rejected for above-mentioned causes and who carried out the advice offered them upon]e ection. This advice has been particularly in reference to symmetrical exercises, to be faithfully and regularly carried out. Some have accomplished the end by joining the Y. M. C. A. classes and others have worked in other gymnasia, while one lad told us that he did his work in his back yard. He had been rejected for a spinal curvature which in about six months was sufficiently straightened to justify accepting him. It is suggested that distinction between slight gradual lateral spinal curvatures and the angular variety be made clear to new examiners. Of course the straightening process will continue at naval training s ations. As with flat feet and functional murmurs, too many men have been rejected for this condition.

Men have been saved at our substations by keeping a list of rejections with addresses. With the exception of such mani estly bad cases that the petty officer in charge knows there can be no chance with the medical officer, these men are told upon rejection that they might have a better chance with the latter, and that they will be notified in due time of the next visit of the recruiting party. Upon a recent visit to our substation at Spokane, Wash., 12 such men reappeared for examination and 7 were accepted.

Men on substations should have prior experience in recruiting. Every man (except the yeoman) on duty in the Portland office is required to either watch or actually assist in the physical examina-

tions. Since the institution of this rule at this station, the number of men accepted at substations and later rejected at the Portland office has been far smaller.

Instead of summarily rejecting a man for defective teeth, he should be told that if he can arrange to have a dentist do the necessary work, usually the filling of several cavities, he will be accepted. He should be cautioned not to get temporary fillings, and to steer clear of the advertising "painless" dentist. In one instance we found the man had obtained two nicely polished silver surfaces on large gutta-percha fillings. The tops gave way under the pressure of a probe.

It is believed men are unnecessarily lost by rejection for piles, when the real condition is one of distention of the perianal veins. While these veins are frequently distended in connection with hemorrhoids, many cases are unassociated with actual piles. Hemorrhoids are of the hemorrhoidal veins, and from this standpoint there is no such thing as an external pile. If a true hemorrhoid is outside the sphincter, it is there by reason of protrusion from within and can be replaced. One might conclude, then, that hemorrhoids can be diagnosed only by palpation within the rectum or by speculum. By the latter, yes; but not by palpation. They can be diagnosed only by inspection. It is suggested that a suitable speculum be furnished recruiting offices to be used at least where piles are suspected. In our experience they have been frequently associated with varicose veins and varicoceles.

PIN-POINT METHOD OF SKIN GRAFTING WITH A NEW TECHNIQUE AND AFTER TREATMENT.

By J. Duff, Assistant Surgeon, United States Navy.

The wounds treated in the present war are, in a great number of cases, caused by shell fragments, and therefore more or less extensive. Infection has been successfully combated by the Carrel-Dakin and other methods, but frequently as much time is lost waiting for the skin to grow as in fighting infection and stimulating granulation.

Various methods of skin grafting are well known, but the Rividin, or pin-point method, has proved, at least to the writer, to be the most efficient. The Thiersch graft, if successful, is most excellent, but unfortunately success is not common. Skin scrapings may or may not take. Usually they do not. At best it is only a haphazard method.

The Rividin method presents obvious advantages. Many small bits of skin are used and if a few die they do not preclude the success of the operation, for the remaining grafts will grow just as well. On the other hand, if the large Thiersch grafts fail the whole operation must be repeated. The technique and after treatment herewith

presented is not in the experimental stage, because of the fact that it was absolutely successful in all but two of the 50 or more cases in which it was used.

The grafts may be autogenous or homonomous, the end results from both being practically the same. For convenience the autogenous graft is usually the most desirable. The grafts may be taken from any part of the body, but the area selected should be that which is subjected to the least possible strain, pressure, and tension postoperatively in order that the maximum of comfort may be assured the patient.

TECHNIQUE.

Anesthetic.—Any of the local or general anesthetics may be used. However, if the area to be grafted is of considerable size, a general anesthetic should be employed. Local anesthesia with one-half per cent cocaine or 2 per cent novocain is frequently very satisfactory, but care should be taken not to infiltrate the tissues, for grafts taken from skin in this condition rarely take. Sensation should merely be blocked by the intracutaneous injection of the solution.

PREPARATION OF THE SKIN FROM WHICH THE GRAFTS ARE TO BE TAKEN.

First day.—The skin should be thoroughly washed with soap and water for 10 minutes with sterile sponges. Next a soap poultice, made by saturating sterile gauze with sapo mollis, should be applied and allowed to remain for at least 10 minutes. This is a most important part of the preparation, for it softens the skin, making cutting easy. When the poultice is removed wash the skin with normal salt solution, follow with alcohol, which should be given time to evaporate, and apply a dry sterile dressing.

Second day (just before operation).—Scrub the skin with sterile sponges and soap and water for five minutes, wash with normal salt solution, and dry with a sterile towel. Surround the prepared area with sterile towels or sheets and cover with a sterile pad.

Preparation of the area to be grafted.—In the first place, the granulations should be as clean as possible; that is, they should be comparatively free from pus. This may be accomplished by frequent wet dressings for a few days before grafting. At the time of operation, if the granulations extend above the surrounding skin they should be rubbed down with dry sterile gauze until they are on a level with the skin. The process of rubbing down the granulations should not be hurried. Firm, long strokes are preferable to short, sharp ones. The most distressing complication occurring from rubbing down the granulations is hemorrhage, but this is easily controlled by the application of sterile gauze wet with hot normal salt solution and pressure applied for 7 to 10 minutes. When the gauze is removed, the denuded

surface will be found to be covered with a moist, glistening film of blood clot which, when exposed to the air for a few moments, dries and proves a most admirable resting place for the grafts. If there is any bleeding when the gauze is removed, pressure should be again applied or operations suspended for a few moments until the blood is clotted, for the grafts stick and grow very much better on a surface that is primarily dry. The skin about the denuded area should now be thoroughly cleaned, dried and coated with 7 per cent iodine. Care should be taken that none of the iodine reaches the new grown epithelium, extending inward from the margin of the wound, because it will invariably kill the growth. Exuberant granulations about the margin of the wound may be hindered and often prevented by painting them, preoperatively, when they show the slightest indication of becoming troublesome, with tincture of benzoin compound once or twice a day. The avoidance of injury to this marginal epithelium is of great importance, because if it is destroyed the process of repair is thereby materially lengthened. When the denuded area is dry and the surrounding skin has been painted with iodine, the part should be draped with sterile towels or sheets. Asepsis is imperative throughout the whole operation.

Technique of cutting the grafts.—Contrary to the general belief, large pin-point grafts—we have frequently taken them three-eighths of an inch in diameter—prove quite as effective as the minute ones. In fact, the larger ones are preferable, as they grow more rapidly and there is less chance of their being removed with the dressing. A cambric needle, about size 5/10, held in a heavy hæmostat, at any convenient angle, is probably the best instrument for elevating the skin preparatory to cutting. The snap provides a firm hold and enables the operator to avoid all unnecessary movements, thereby saving time, which is always a factor, and facilitates the application of the grafts at the desired points. A cambric needle should be used because it does not cut through the skin when tension is applied. The needle should be thrust into the skin only so far as to assure a firm hold, for, besides proving inconvenient when coming in contact with the knife blade, it may perforate the deep layers of the skin and traumatize unnecessarily the malphigian layer, from which growth occurs. All unnecessary trauma to this layer should be avoided, particularly the practice of drying the drop of blood or serum that frequently appears on the cut surface of the graft, because this substance proves, as it dries, a most admirable cement.

A knife with a thin blade, about 6 inches long and a quarter of an inch wide—we use an old worn amputating knife—will be found best for the following method of excision: When a conical elevation of the skin has been made with the needle, the incision is made, starting close to the heel of the knife, one stroke severing the graft, cutting so that the surface to be applied is concave rather than convex.

This method of excision, gives the cut graft an umbrella shape, which makes application more easy and sticking qualities far better. A graft with a convex surface and cut with a short knife which, because of the necessary short strokes, produces a very rough surface is, even from a mechanical standpoint, undesirable.

The distance that the grafts should be from one another is of very little importance. The most important point to be remembered is that they should be first of all planted about the margin of the area so that they will unite as soon as possible with the marginal epithelium. When the grafts have all been applied they should be exposed and dried for about 10 minutes. In cutting the grafts, particularly on a curved surface, if the first are taken at the lowest possible point and each row successively higher, the inconvenience of having the skin from which the grafts are being taken covered with blood will be avoided.

Immediate postoperative dressing.—Compress cloth, or any other nonabsorbable material, with very small diamond-shaped perforations about three-eighths of an inch apart, is a satisfactory protection when applied firmly immediately over the grafts. The firm and stationary application of this dressing is of the greatest importance, because it is the main protection for the grafts and the new epithelium. The critical period is the three days following the operation, and during this time pressure must be constantly applied to the grafts. By the liberal use of collodion and a loose sandbag this may be accomplished. For instance, if an area on the anterior aspect of the thigh has been grafted, one side of the compress cloth should be first stuck to the skin with collodion an inch to an inch and a half from the margin of the wound. When this has thoroughly dried, the two opposite corners should be grasped firmly between the thumbs and forefingers and stretched tightly. While it is still under tension it should be carried over the grafts and stuck on the opposite side with collodion. In this way, because of the natural elasticity of the skin, a constant pressure on the grafts is obtainable. Collodion should likewise be applied to the two remaining sides. The compress having been made fast, sterile gauze, moistened with warm normal salt solution should be firmly packed over it. A firm bandage over oiled silk and sheet wadding is now in order, and over this dressing, if the pressure is in any way doubtful, the loose sandbag should be applied.

The post-operative care of the graft.—We have found that for 12 hours after operation it is best not to disturb the first dressing. For the next 24 hours, new gauze, moistened, but not wet, with normal salt solution, should be applied every four hours. Almost invariably a considerable amount of pus is formed and this is very much better absorbed by moist rather than wet dressings. Such frequent dressings do not injure the graft because of the immovable compress dressing. For the second 24 hours similar dressings should be

applied every six hours and three times on the third day. For the next two days, depending on the amount of pus, one or two dressings should be done. By the sixth day, if ever, the grafts will have taken. The next problem is to remove the compress with the least possible injury to the new epithelium. Usually, in spite of all precautions, the serum has caused the cloth to stick to the grafts and if it is carelessly removed they are very likely to accompany it. This undesirable possibility may be prevented by soaking the part or the dressings for 5 to 7 minutes in a solution of chlorinate of soda (U. S. P.), 2 drams to the pint of hot water. Strong solutions of and long immersions in the chlorinate will kill the grafts. When the crusts have been softened, the compress should be cut with scissors just above the collodion and carefully removed. The remnants of the cloth may be removed at the same time or later. Some pus even now is usually present, so it is wise to apply a warm 2 per cent boric dressing for a day or so. An occasional application of a weak chlorinated solution for a short while often helps. Stimulating ointments should not be used until the pus has entirely disappeared. Very frequently, because of the stimulating effect of the ointments, the granulations surmount the grafts. This should be prevented by the judicious use of silver nitrate because the new epithelium will not grow over these obstacles.

When the grafts have started to grow well, all that is needed is a stimulating dressing once every day or two until the area is covered, and even when it is all covered a protective dressing of some sort should be worn for a reasonable period of time, because the new epithelium is very tender and sensitive to trauma.

USE OF CRÊPE PAPER BANDAGES FOR SURGICAL DRESSINGS.

By H. F. Strine, Medical Inspector, United States Navy.

With the increasing scarcity of cotton the necessity of finding some substitute for it is constantly growing.

During the past month bandages of crêpe paper, manufactured by the Dennison Manufacturing Co., have been used in the surgical wards of the United States Naval Hospital, Washington, D. C., with very satisfactory results, especially in cases where the simple retention of dressings is all that is desired. These bandages are remarkably strong, possess a considerable degree of elasticity, can be very neatly applied and are very much cheaper than gauze. It is believed that their more general use throughout the service will result in a distinct saving of gauze. In cases where there is much discharge from wounds or where moist dressings are used, the paper bandages can not be employed.

BOOK NOTICES.

A TREATISE ON CLINICAL MEDICINE, by *W. H. Thomson, M. D., LL. D.* Second Edition. W. B. Saunders Co., Philadelphia, Pa., 1918.

The book is charmingly and convincingly written. One can not read it without fervently longing for a better memory with which to retain the innumerable suggestions of value on diagnosis and treatment based on a personal experience which have made the author the master clinician. The sections on catching cold, vomiting, emaciation are interesting and illuminating. The author believes in the power of drugs and speaks with assurance and conviction of remedies that will cure. This is unusual but gratifying. There is a very general tendency in America to-day to speak disparagingly of drugs, due to the fact that men who are good in the laboratory, good surgeons, good diagnosticians, *do not know* the physiological action of drugs because they have long neglected this subject and so are unable to get results from their remedies. This is the age of vaccines and serums and some of our ultrascientific practitioners find themselves equipped with nothing better than a placebo when called to treat maladies for which vaccines and serums are not available. What is surprising in this truly attractive and valuable volume is the meagerness with which certain topics are handled, c. f., pellagra, beriberi.

LOCAL AND REGIONAL ANESTHESIA, by *C. W. Allen, M. D.*, Assistant professor of clinical surgery at the Tulane University of Louisiana. Second Edition. W. B. Saunders Co., Philadelphia, Pa., 1918.

To those familiar with the first edition of this work no word of commendation upon it need be addressed. To others the issue of this work will come as an agreeable surprise because of its fullness, completeness, and clearness. In the 23 chapters spread over six hundred and odd pages the history of local anesthesia is touched upon, pain, pressure anesthesia, all local anesthetics, the surgical uses of adrenalin, general principles of technique, the use of morphin and scopolamin, shock, the application of local anesthesia in the various parts of the body, such as the upper and lower extremities, the neck, the thorax, the abdomen, in hernia operations, the use of local anesthetics in genito-urinary diseases, spinal analgesia, the organs of speech, sense, and dental anesthesia are exhaustively treated. The book is amply illustrated. It should prove a valuable addition to the hospital library.

ANALYTIC CYCLOPEDIA OF PRACTICAL MEDICINE. Edited by *Charles E. de M. Sajous, M. D., LL. D., Sc. D.* Seventh revised and enlarged edition, F. A. Davis Co., Philadelphia, Pa., 1918.

This work in nine volumes reflects the greatest credit on the editor and his hundred active associates, among whom are numbered the foremost medical men of the day in Europe and America. By means of the Index-Supplement it has been possible to bring the book up to date in a literal sense so as to include the Carrel-Dakin methods, the paraffin treatment of burns and other recent developments largely confined hitherto to current periodical literature, brochures, and monographs.

MODERN UROLOGY. Compiled by *Hugh Cabot, M. D., F. A. C. S.* Lea & Febiger, Philadelphia, Pa., 1918.

Profusely illustrated work of 1,300 pages, in two large volumes. An interesting departure from precedent is the presentation in the first chapter of a brief history of American contributions to urology.

MODERN OPERATIVE BONE SURGERY, by *Charles George Geiger, M. D.* F. A. Davis Co., Philadelphia, Pa., 1918.

This is frankly a treatise on plastic bone surgery which considers only the autogenous bone transplant "for it is THE safe and sound procedure," according to Charles Geiger, presumably the same person as the Charles George Geiger, of the title page. From a rapid perusal of the book it is evident that the bone surgery described is that of Geiger and of Geiger only and done by his methods and with his instruments. In other words, it is a monograph without references or bibliography. Nothing could be more admirable than this form of presentation and nothing more satisfactory to the surgeon of experience who wishes to study the author's views and methods. The young surgeon just entering the field will not be satisfied with such ex parte judgements but will prefer to get a variety of views, especially on the treatment of a broken elbow or knee cap.

THE FITTING OUT AND ADMINISTRATION OF A NAVAL HOSPITAL SHIP, by *E. Sutton*, Fleet Surgeon, Royal Navy; Senior Medical Officer, R. N. Hospital Ship "Plassy"; Late S. M. O., R. N. Hospital Ship "Drina"; Late Surgeon, R. N. Hospital Ship "Malacca." John Wright & Sons, Ltd., Bristol, 1918.

The author, after more than three years' experience with hospital ships, is in a position to speak with authority. He treats his subject under four heads: 1. Evolution of the hospital ship. Geneva Convention. Uses and abuses of hospital ships in war time. 2. Conversion of passenger steamers to hospital use. 3. Ordinary organization (embarkation and disembarkation, book routine, departmental organization). 4. Emergency. So far as structure is concerned the author deals solely with the adaptation of ships from the passenger and freight service to hospital purposes, and makes no reference to

the designing and outfitting of a ship for this special use. The book is not intended to make entertaining reading but will repay careful study on the part of anyone facing the problem of organization and management of a hospital ship.

SYPHILIS AND PUBLIC HEALTH, by *Edward B. Vedder, A. M., M. D.*, Lieutenant Colonel, Medical Corps, United States Army. Lea & Febiger, Philadelphia, Pa., 1918.

The author offers the collected statistics with praiseworthy reserve as to their real significance. He considers *syphilis d'emblée* an established fact, cites illustrative cases of the transmission of syphilis by *conception*, and gives some interesting historical data regarding prophylaxis against venereal disease.

Of peculiarly vital significance to-day are the remarks under the heading: Ethics of Venereal Prophylaxis. Vedder establishes the postulate that "venereal diseases are not a punishment for immorality" and disproves the assertion that "the fear of venereal diseases deters many from vice." The conclusion regarding the propriety of prophylaxis is obvious, but the difficulty of employing it in civil life is pointed out. Prostitution as a sociological problem is ably discussed.

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, double spacing and wide margin are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which requires correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles but still more so in reviews. For example, an article by P. A Surg. G. Alen, U. S. N., on Removal of the Gasserian Ganglion, should be headed as follows:

Removal of the Gasserian Ganglion.

By G. Alen, Passed Assistant Surgeon, United States Navy.

If a review is submitted of an article by J. E. Thompson, M. B., B. S. (Lond.), F. R. C. S. (Eng.), F. A. C. S., Galveston, Tex., Professor of Surgery, University of Texas, entitled "A Study of Modern Operations in Hypospadias from an Anatomical and Functional Standpoint," appearing in Surgery, Gynecology, and Obstetrics, Volume XXV, No. 4, October, 1917, the following heading would conform to the usage of the BULLETIN in recent years:

Thompson, J. E. Modern Operations for Hypospadias. Surg., Gynec., and Obst. October, 1917.

The author's initials are important, not so his titles. If the reviewer is not familiar with the exact abbreviation employed by the Index-Catalogue of the Surgeon General's Library and the style adopted by the American Medical Association Press, it is best to write the name of the periodical in full.

The *greatest accuracy and fullness should be employed in all citations*, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions which require illustration must be received two months prior to the date of the issue for which they are intended.

Only the names of actual reviewers for a current number appear.

The BULLETIN prints only original articles, translations, in whole or in part, and reviews, and all original *contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

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This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

NOTE.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume X, No. 1, January, 1916.
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Exchange of publications will be extended to medical and scientific organizations, societies, laboratories, and journals. Communications on this subject should be addressed to the Surgeon General, United States Navy, Washington, D. C.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties, with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in parts as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,
Surgeon General United States Navy.

I THE SIXTEENTH CENTURY.
ges (1521–1525) for the support of the

i Voltaire, Paris.)

U. S. NAVAL MEDICAL BULLETIN.

VOL. XII OCTOBER, 1918. No. 4.

SPECIAL ARTICLES.

REPORT ON HEART MURMURS IN RECRUITS.

By J. F. B. CORDEIRO, Lieutenant Commander, M. C., United States Navy (Ret.).

Preliminary.—By the theory of probabilities it is proved that the incidence of any particular event in a sufficiently large number is a fixed quantity. Thus there is a center of American population geographically fixed, an American height and weight, etc., which do not vary over long periods. It was Quetelet, one of the founders of our modern system of life insurance, who showed that in the constant French population the number of even unusual and rare forms of suicide remained constant. The average yearly temperature of any point upon the earth's surface is a constant quantity. This constancy depends upon the fact that the average conditions are the same from year to year. If, however, some average which has remained constant for a long while, begins to change, either rapidly or gradually it must be from some deep-lying or general cause. Thus the incidence of consumption for the total population was some years ago practically constant, while recently it has been showing a continual decrease. This we know to be due to active modern methods for its prevention and cure. Likewise the incidence of heart disease for the total population is gradually increasing, but we do not as yet know the reason.

It has been known for a long time that lesions of the valves of the heart are in the great majority of cases, due to the poisons of certain acute infectious diseases—rheumatic (micrococcus) fever, scarlet fever, typhoid fever, measles, diphtheria, etc.—and almost invariably it is the left heart which is affected—mitral and aortic lesions. It has been the experience and opinion of the profession, until recently shared by the writer, that lesions of the right heart were comparatively rare. Thus Satterthwaite states that lesions of the pulmonary valves are only one-tenth of all valve lesions. He says that his statistics are derived from his personal cases, private and hospital. Such statistics, however, are of little value in giving a clue as to the incidence among the population, since the cases going about their usual vocations and unconscious of any heart affection greatly outnumber those that are obliged to go to a hospital or to consult a physician.

In 1886, the writer was examining one hundred or more men a

day, just as he is doing now, and his experience then was that pulmonary murmurs were rather rare. It is not merely a matter of memory, since the statistics are at hand. He made a compilation of some ten thousand cases, of which possibly he examined a third, where the causes of rejection and the number of such cases were carefully tabulated. The valvular lesions were not separated but all included under the head of valve disease. The proportion of such cases was about the same as that found for endocarditis (left-heart disease) to-day. The incidence of these acute infectious diseases for the total population is the same to-day as it was then, and the proportion of heart complications in these cases is practically constant, as it should be by the theory of probabilities. The probability is therefore strong that the proportion of pulmonary lesions among those tabulated was small. This examination of ten thousand cases was published in the report of the Surgeon General for 1887. In it, the growth curve, both for height and weight, was carefully plotted, and it is with little doubt the normal growth curve for American males between the ages of 14 and 80. It should be used in examinations and permissible deviations should be taken from this curve—not from the present tables.

Pulmonary murmurs.—The writer has recently examined personally some thousands of applicants for the Naval Reserve. It was with some surprise therefore that he found that pulmonary murmurs far outnumbered all other forms of murmurs—perhaps ten to one. When coming upon something out of the ordinary it is necessary to go over the ground very carefully and especially to guard against errors. The ordinary experience of mankind is something like the law of the Medes and Persians which altereth not.

When examining aortic or pulmonic murmurs, careful examiners always do so on full expiration. There are indivuals (obese ones) in whom on full inspiration it is impossible to hear any heart sounds at all, and to listen to them it is necessary to require full expiration.

Pulmonic and aortic murmurs are heard louder on expiration than on inspiration, while generally a mitral murmur is heard best at mid inspiration—neither extreme inspiration or expiration. It may happen therefore that an examiner may not hear a pulmonary murmur, but when requested to listen at full expiration, he always finds it very loud and distinct. After finding it he usually has no trouble in following it through the whole respirational cycle, though of course it is fainter at inspiration. The reason for this is that at inspiration the edges of the lungs cover both the pulmonic and aortic valves with a considerable thickness of lung tissue and air cells are poor conductors of sound. Further the "roots" of the lungs are not immobile, but on each inspiration the pulmonary artery with its

right and left branches, is drawn away slightly from the sternum, while on expiration it is pushed forward again. The pulmonary artery is therefore appreciably nearer to the chest wall and the stethoscope on expiration.

As an illustration of this class of pulmonary murmurs let us take the following actual case. An ordinary perfunctory examination (the once over) reveals a distinct pulmonic direct murmur and also, though not so distinct, an aortic direct and a mitral regurgitant. This case is not typical because in most of the cases of pulmonic direct, there are no other murmurs. On expiration the pulmonic murmur is very loud—rough and rasping. It sounds like a saw cutting through a board. The man is asked, "Have you ever done any running?" The question seems absurd, as any one who has done any athletics himself, or been among athletes, would recognize at once his typical greyhound build. The man smiles as well as two friends who have come with him. He proves to be a crack two-miler, well known among the sporting fraternity. There is marked hypertrophy and some dilatation. This is not typical of these cases, since usually hypertrophy is not marked and dilatation may be difficult to detect. This is because the majority of these murmurs are in the initial stage. These murmurs are rough, as direct murmurs usually are; regurgitant murmurs are soft. Fifty sound hearts may pass in review and then another direct pulmonic. This time it is a champion bicycle rider; distance 10 miles and upward. Murmur very much like the other, but not quite so loud; no other valves involved. Case seems like a previous stage of the former. To make sure that these murmurs were facts and not a theory, I referred a number of them to another examiner. He pronounced them all very loud and distinct. It is a fact then that a very appreciable portion of our young men have pulmonic direct murmurs and that these murmurs are perhaps ten times as frequent as all other murmurs combined. The cause of rejection was always noted simply as heart murmur, not heart disease or valve disease. This was because the murmur was a fact, while other things might be a matter of opinion. It happened in a few cases that applicants had already been accepted by the medical examiners of the draft boards and had sought to evade the draft by entering the Naval Reserves. They were very much perturbed and promptly brought certificates from their family physicians that their hearts were sound. These opinions were probably sincere and due to the fact that they had not taken the precaution to listen during expiration. There was one case, however, where a heart specialist wrote to the draft board that his client had heart disease and when the board would not excuse him, gave him a letter for the Naval Reserves, saying that his heart was sound. As a matter of fact he did have heart disease and was rejected.

The possibility of these murmurs being functional was carefully considered. So-called functional murmurs are usually soft and heard over the apex in connection with such conditions as anemia, chlorosis, acute loss of blood, etc. They are fugitive and difficult of detection, two examiners often disagreeing as to their existence. The pulmonary direct murmurs were permanent, as was proved by subsequent examinations. Rejected candidates often insisted that there was nothing the matter with their hearts and sometimes were fortified by physicians' certificates. They insisted that the trouble found was because they were nervous or had been smoking or drinking excessively. It may be remarked that no rejections were made for functional disturbances such as palpitation, bradycardia, etc. Such cases were invited to present themselves for reexamination as often as they wished and the murmur was always found unchanged in character or loudness. Some of the petty officers in charge of substations would send a man rejected for heart murmur a second time, evidently believing it to be something temporary or a fad on the part of the examiner. In every case the applicant was identified more easily and certainly by his heart murmur than he would have been by a finger print. Cases examined three months afterwards were unchanged.

In some individuals it is possible that the pulmonary artery may touch the surface of the sternum on extreme expiration, or even be pressed against it. The mechanical pressure would then explain the murmur. But the murmur could be heard through the complete respirational cycle, fainter, of course, at inspiration, and when the supposed pressure was removed the murmur should have ceased, which was not the case.

The pulmonary artery rises very superficially from the top of the ventricle and is only 2 inches long, sometimes less. It bifurcates into two branches, right and left, which are almost at right angles to each other. In foetal life, when the lungs are solid, the ductus arteriosus shunts the blood from the left pulmonary branch into the descending aorta. Such a thing as a persistent ductus arteriosus or a patent foramen ovale are inconsistent with prolonged life and can not be considered in these cases, but conceivably the remains of the duct might leave a rough tubercle within the left pulmonary branch. The sudden bifurcation of the blood stream and the remains of such a tubercle might conceivably ruffle the current sufficiently to cause a murmur. This, however, would not explain the occurrence of the murmur so preponderatingly among athletes.

The rough rasping sound is carried both up and down from the valve and is not necessarily loudest over the valve. In some cases where the sound is heard only just over this valve, which is the most superficial of all the valves, and is not very loud, I have concluded

that it could be accounted for by the resistance to the current offered by the corpora arantii. Such cases are not rejected. The general impression gained from these sounds is that they are not due to any lesion of the semilunar valves themselves, but rather to a constriction of the ventriculo-arterial orifice which may extend to some distance on both sides of the valve.

The majority of the pulmonic murmurs occur among athletes and I have designated them as athletic murmurs. They are found chiefly among runners, though they occur in all forms of athletics where there is a steady, prolonged grind. If a heart be examined after a Marathon, it will be found to be acutely dilated. Percussion will easily show that the borders of dullness are markedly extended beyond the normal area. The best way to demonstrate this is to mark out the area of dullness with nitrate of silver before the race and directly after. It will be found that it will take several hours before the heart retracts to its old area. The strain of a race is thrown almost wholly upon the right heart. The left heart participates to a much less degree. The call is for blood and air in the lungs and the right heart endeavors to supply a double amount of the former. The pain in the side is a symptom of this abnormal effort. Another subjective symptom is the agonized look on the face of a runner as he does the last 75 yards' sprint after a long race. The Greek word ἀγωνία means both agony and an exhaustive contest. In the ancient Olympian games a foot race or a wrestling bout was called ἀγωνία. It is significant that no man ever wins a Marathon twice because his heart has been permanently injured. The first Marathoner is said to have dropped dead at the finish. It is likewise significant that the career of all runners is usually short. After making their best marks, they rapidly decline and they never "come back."

For various reasons nearly all of the athletes around Boston, both professional and amateur, have sought enlistment in the Naval Reserve. Some said it was because of their great love for the sea; others because they thought it safest. This undoubtedly accounts for the great number of pulmonary murmurs found. Professional coaches, of course, know nothing about the heart and medical athletic advisers are not heart specialists and usually incapable of making a discriminating diagnosis. Otherwise the conditions of which I have written would have been discovered long ago and this report would not have been necessary.

Pathology.—The pathological history of these cases seems to be as follows: At first, after each abnormal dilation, the heart contracts to its normal size, or nearly so. But a physiological hypertrophy accompanies these efforts and the pulmonary orifice, instead of contracting to its former dimensions, eventually overcontracts and becomes slightly narrowed. This may be furthered by the de-

velopment of new muscular tissue about the orifice. In a whole series of cases it is possible to follow the process from beginning to end. The first sign is the development of a pulmonic direct murmur, which, as we have said, is probably due to the contraction of the orifice. This murmur may be slight, though rough, and hypertrophy and dilatation may be difficult to detect. Later the left heart is involved mechanically and we have mitral and aortic murmurs, as in the case of our crack 2-miler. In only two cases was a pulmonary regurgitation found associated with the direct murmur. If veterinarians were capable of ausculting a horse, which usually they are not, precisely similar conditions would be found in race horses. It is a frequent occurrence for horses to drop dead upon the track, both while racing and practicing. Outside of the few cases of aneurism, these deaths are due to the "athletic heart."

These murmurs, while occurring chiefly among runners, were also found in footballers, basket-ball players, boxers, wrestlers, and among rowing men. Baseball players seemed to be least affected. A hammer thrower was found to have a perfectly sound heart. The above were mostly adults, but it must be remembered that every secondary school nowadays considers it necessary to have a complete athletic system of its own, exactly as in a college. If it does not have its track team, its rowing crew, its football team, its baseball team, and its professional coach it is not up to date. But the contagion does not stop there; it spreads to all classes and conditions of boys, even to the slums. Many of these boys, undeveloped and imperfectly developing, without proper food at home, and often without a midday meal, practice assiduously every afternoon on a field. While their anemic systems are struggling with the burden of the rapid growth after puberty, they subject their hearts to the added strain of the track. Of late years it has been a common sight to see a group of half-naked men and boys, mornings and evenings, making their painful way over the streets of our suburbs. Once every year a large part of the population of greater Boston distributes itself over 26 miles of highway to watch the agonized faces of some hundred contestants while they are ruining their hearts.

Lastly, we must speak of another class of pulmonary direct murmurs, which, while indistinguishable clinically from athletic murmurs, have been found less often, and present a picture of their own. It seems that these cases can be attributed to an incoordinated development of the great vessels relatively to other parts of the body.

I have called them, tentatively, hypoplastic murmurs, though, of course, hypoplasia of the great vessels is a condition which can only be diagnosed upon the autopsy table. They occur only among the poorer classes and seem to be clearly the result of insufficient nutri-

tion. There is usually a weedy growth in which the nutrition seems to be expended wholly in increasing the length of the body while the other parts remain stationary—notably the great vessels. The rule in such cases, to which there are of course exceptions, is that the subjects are very much under weight for their height—20 to 40 pounds underweight. Their complexions and skins are pasty and pimply, in marked contrast to the clear skin of health, in which specimens there are never heart murmurs.

Here is a typical picture: Height, 6 feet; weight, 40 or 50 pounds below normal for height; skin, sodden; chest, narrow and barrel-shaped; face, dull and apathetic; intelligence, subnormal; reflexes, slow; thinks and answers slowly; very loud and distinct direct pulmonic murmur; very often, also, teeth and vision are defective. What as to prognosis? These runners usually ask if they have anything very serious. They are told that their condition is not serious unless there is marked hypertrophy or other valves are implicated, but all are always advised to stop running and all gruelling contests. The affection is not considered a lesion of the semilunar valves, which are probably in no way directly affected, but rather a deformation of the orifice. But the murmur is not functional, as the term is usually understood, since it is permanent and probably represents a definite anatomical (pathological) condition. Its direct influence on the duration of life is probably slight unless the causes which produced it are persisted in. But no surgeon, after hearing one of these loud murmurs, would be willing to anaesthetize the subject for an operation "de complaisance," or if he did so, it would be only with the greatest precautions. Where an operation was imperative, the patient would experience a danger which would be nonexistent if his heart were sound.

The importance of the above discussion from a military point of view must be evident. We shall assume that all the points made have been established, but the fullest investigation is desirable and necessary so that all possible doubt and mistakes may be cleared up. Having examined recently a large number of athletes, professional and amateur, the question occurs to the writer whether they are not of distinctly less value from a military point of view than the average normal man. It seems that this must be answered affirmatively.

It may be that one of the reforms springing out of this war will be—not the abolition of athletics, but a revision of our present insane athletic system. Physical exercise from a recreational and hygienic point of view is necessary, but beyond that point is a waste of time and may be injurious. Track athletics among boys is criminal, and among their elders is of no value to the participants or the community, but on the contrary tends to spoil what would otherwise have been good military material. The boxer who remains in a comatose

condition from 5 minutes to an hour, or who suffers a hemorrhage into the brain, does not improve his body or his mind, but in rebuttal it may be said that he usually has so little mind to start with that any alteration is of slight importance. It may be that our institutions of learning, instead of turning out half educated foot-ball heroes will develop mental athletes, and it will be recognized that the mind is of much more importance than the body. Finally the writer would say that he is absolutely without prejudice in these matters. He is not against athletics per se, but only against those foolish and vicious forms which can be clearly proved to be injurious.

PHYSICAL DIAGNOSIS, PREVENTIVE TREATMENT, AND RECONSTRUCTION IN RELATION TO CARDIAC AND TUBERCULAR DISEASE.

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We must recognize the fact, from recent clinical observation and statistical information, that pneumonia is the overwhelming acute disease of modern incidence and prevalence. The rapidity of development of the physical signs, however, renders its diagnosis comparatively easy and confirmatory of its symptomatic onset. The inherent difficulty and seriousness of the diagnosis of incipient signs of heart disease and pulmonary tuberculosis stand out essentially because of the very uncertainty, insidiousness, variety, and obscurity of their earlier manifestations.

The tuberculosis problem is stupendous; its persistence and pervasiveness, like poverty, is ever with us with convex prominence.

Of all the diseases of infection and chronicity it is the most colossal burden both of civilized society and humanized science; accordingly, the lifting of it may confer the most colossal benefits; or its loading down may result in the most colossal blunder in blighting and blemishing the contiguous races of humanity.

It is a paradox, for it is at once simple and complex; simple in the known elements and principles of causation, propagation, morbid processes, recognition, and prevention; complicated immensely in the multitude of facts and the matrix of actions, interactions, influences, and correlations of subtle and inevitable forces; complex factors of heredity and environment, of predisposition, and communicability, of pathology and differential diagnosis, of immunity and climatology, of sociology and therapeutics.

Essentially, tuberculosis represents the pathologic panorama of a tremendous battle, between the tender and tired body and the tubercle bacillus.

The problem is in course of solution. The great world war against Prussianism and Pan-Germanism has added but another phase which may compel factoring and transposing anew; and perforce elevating the contingency to the nth power.

I suppose it will be granted freely and universally that no two organs are so vitally important in the sifting process of physical examination as the heart and lungs. Already the cardio-vascular and tuberculosis commissions have done a large work in the classification and estimation of data pertaining to these organs as examined in registrants for the Army and Navy service.

The principle of the detection of disease in its incipiency presupposes the preparedness of diagnostic acumen and efficiency. This we all know and believe; it is the magnitude and meticulousness of the problem and modes of application that call for a decided emphasis and renewed study in view of the naval and military, as well as economic and industrial, situation and stress of the times. We look for the best fruits and largest benefits of preventive medicine in the preservation of health and vigor, the promotion of reserve and endurance, and the prolongation of life by just this factor of the prompt and positive discovery of early morbidity; of the functional derangement before the organic degeneration and disaster; of predisposition, whether inherited or acquired, before implantation, aggravation, and complication.

While it must be admitted that in the broad approach to diagnosis various aspects of morphology and symptoms must be taken into careful consideration, at the same time it must not be forgotten that no balanced judgment or sufficiency of precision can be attained without a skillful technique and rational interpretation of the physical signs. To quote from the preface of my textbook on Physical Diagnosis, we must constantly avoid doing that which medical students are particularly apt to drift into, namely: "To exhibit a superficial and hasty zeal and endeavor to get at the physical signs somehow, but without methodical and patient procedure and practice; * * * jumping at conclusions from insufficient data and inefficient correlation."

If this article may be assumed to have any suggestive value, it will most probably be in emphasizing therefore the more determining and discriminating physical signs rather than the reviewing and repeating of merely symptomatic salients. In the first place, I should like to advocate the adoption of special examining officers respectively for heart cases and tuberculosis suspects.

The cardiopathies.—Recently we have had a renewal of a very serious discussion concerning the perplexing problems presented to the medical examiners of prospective candidates for the Army and

Navy. Says the editor of The Journal of the American Medical Association (Feb. 23, 1918): "What constitutes proof of disqualifying cardiac conditions? Of course, in most instances, the answer is clear; even on closest scrutiny, the heart is free from any sign or symptom of disease, or, on the other hand, the history and examination reveal unmistakable evidence of organic mischief in valve or muscle. The more questionable cases are those in which the rate, rhythm, or size are not according to the generally accepted standard, or those in which an endocardial murmur arrests attention." Symptoms of heart inefficiency should neither be minimized or glossed over, nor, on the other hand, magnified to the point of needless and unjust rejection. "Common sense, experience and a sizing up of conditions in their entirety may here reach the correct conclusion that would be missed were one to rely on the presence or absence of murmur, the pulse pressure, the rhythm, the rate before and after exertion, or the instrumental record."

The recognition of the so-called hemic and accidental murmurs, such as the cardio-respiratory, need not preclude the acceptance of a registrant, other things being equal. We may also agree with Babcock and Mackenzie that not a few clear cases of endocardial murmur of organic valvular origin may be passed into service without any slack in efficiency or endurance. And again, as Fisk has very properly pointed out, there has been such a large percentage of apparently acceptable life-insurance risks that have ended disastrously, that the utmost caution and reserve of clinical judgment should be exercised in the estimation of so-called functional heart signs and seemingly insignificant, single organic heart murmurs. In short, it is a very easy job to detect even the earliest manifestation of *heart failure;* it is a very delicate, difficult, and responsible job to discriminate a *failing heart.*

Quoting again from the sound editorial just referred to: "After all has been said about the relative meaninglessness of certain murmurs and extrasystoles and tachycardias, must we not admit that, given one of these departures from the normal, the burden of proof is with the one who claims their insignificance? Grant that the outdoor life, the regular military drill may benefit a flabby myocardium; grant that the mitral leak may be slight, the secondary changes not manifest even to careful examination; grant that the heart is competent to meet all ordinary demands of civilian life; the question is: Will it be able to stand up under the storm and stress of the Army? Can it meet the sudden emergencies, the exposures, the physical and nervous shock that will come? May it not break down in a few years?"

Says Fisk, also: "It is well to know that organic impairment need not be rapidly progressive. It is equally important to know that, on

the average, it definitely shortens life even in apparently favorable types, and emphasizes the need for hygienic living among those showing persistent heart irregularities or murmurs.

"We may well take heed lest there be turned back into civil life, after the war is over, an unduly large number of damaged men. Men who now show an extra mortality of from 50 to 100 per cent under ordinary life strain are not likely to be improved under war strain, even though at the outset the camp training is temporarily beneficial."

Let me add in this connection that perhaps the Navy in the case of its active personnel is facing a peculiarly grinding strain in the matter of heart and artery endurance. It is well known that emotional strain may be as pernicious in its effects as physical strain. I do not hesitate to affirm that the requirements of sea duty command the expenditure of more prolonged effort, exposure, corrosion of elasticity, infiltration of vitality, in stress of weather and gale, and ceaseless vigilance in scouting, and tension in fighting. Life on a torpedo-boat destroyer might be likened to automobiling over an earthquaking country. A certain monotony of the sea wears; there is lack of scenic variety and interest; quarters for exercise are limited; conditions are artificial; confinement to cabin and limitation of deck space are wearing. Hence the great need for a steady and thorough application of the setting-up exercises, swimming and the like, which are now being practiced by Navy men as a complement to land activities which are naturally, casually, and more or less constantly indulged in while we walk and work, run and climb, and play out of doors without even plan or purpose. A physical environment which thus inherently discriminates against the Navy must be compensated for by a steady and efficient physical supplement, if the highest degree of health, vigor, endurance, efficiency, and cheerful morale are to be developed and sustained.

Cardiac weakness.—Right here the objective examination of the heart by physical methods rules supremely. Whether associated or not with incipient or distinct disorders in the peripheral vascular system, cardiac weakness—difficulty and functional incapacity at the pumping station—is the primary manifestation to diagnose. The initial, innate, and practical importance of the quantitative vitality of the left ventricle can not be overvalued. Its power is essential; its performance must be steadily rhythmical. But the stability and expectancy of life, other things being equal, are not alone dependent on mere ventricular power and vigor, inherent, temperamental or acquired, but (and here is the crux of the matter) on adequate increments and an adhesive permanence of reserve force; staying power; a vital, reinforced concrete sort of endurance; a margin of safety

against the stress, strain, and speed of existence; a surplus as well as cardiac capital to forestall circulatory bankruptcy.

Very often, before the anamnesis is taken, immediate attention to examination of the cardiac region is virtually solicited by the evident emotion of the subject, an irrepressible mark or manner of fear, anxiety, nervousness from introspective thoughts, morbid garrulousness concerning repetitions of palpitation, and general perturbation of conduct.

A medical history of infectious and toxic maladies should make one particularly alert to the discovery of possible injuries to the heart muscle. Conversely, as a proper move in preventive medicine, clear evidences of weakness of heart action should invite close inquiry into past or present injurious influences of bacterial, autotoxemic or nervous origin.

Here the technic of the physical diagnostician, the methods and logical mind of a Sherlock Holmes in synthetic induction must be dominantly and inexorably linked if accuracy and sound judgment are to be attained. *Pari passu* with the examination of the heart a close study of the pulse quality and rhythm as well as frequency is of like essence in the estimation. The varied and vital factors of significance of tachycardia and bradycardia can not be too often renewed and repeated in the memory while the mind is searching for the pathologic resources for deduction.

Rapid heart action should at once suggest first of all a possible condition of bacterial or toxic causation, a streptococcus or tuberculous infection; even Graves' disease or a tonsillar infiltration. On the other hand, a bradycardia indicates the possibility of chronic tobacco or lead poisoning; the post-infectious consequence of one or more attacks of influenza, pneumonia, or rheumatism; a heart block; premature coronary artery thickening; a neuralgia reflex; a dilated and acidulated stomach.

By palpation and auscultation over the heart the various at least commoner forms of disturbed rhythm are next recognized. However, it is by the study of the apex-beat mainly that cardiac weakness is most positively determined.

Actual weakness of the heart muscle as indicated by a feeble or absent apex-beat can only be inferred if dislocation of the beat (confirmed by percussion) and such extraneous factors are excluded as the following: A rib in front of the beat, emphysema, pericardial or pleural effusion, pneumothorax, tumors, edema of the chest wall. Again, an exaggerated apex-beat may be a weak one, due to a dilated, flabby heart muscle, as proved by the synchronous pulse condition. Also an aneurism behind the heart, or a retracted lung over the heart may afford an exaggerated heart beat that may at the same time be decidedly functionally weak. Finally, it should be

borne in mind that a slowly lifting apex-beat is rather decided evidence of a hypertrophied rather than a failing left ventricle.

Auscultation supplies still more definite, confirmatory or corrective results in the investigation of the intensity of the heart sounds. Here again errors of relative exaggeration and dimunition by adjacent conditions must be carefully measured and allowed for. Thus, dimunitions in the force of the apex beat go hand in hand with dimunitions of the loudness, especially of the first of the two heart sounds. Intensification of the sounds of a weak heart may nevertheless coexist because of the juxtaposition to the heart of a consolidation or large cavity in the left lung.

Pitch, as an attribute of sound is too often neglected in the examination of the heart for abnormal physical signs. Obviously, this must be clearly differentiated from mere loudness. An exaggerated heart action with evidences of hypertrophy is invariably accompanied with elevated pitch of the aortic second sound; whereas mere exaggeration (usually physiological) of heart action has intensification of sound without elevation of pitch. Again, the recognition of a pulmonary valve second sound with pitch as high or higher than that of the aortic second sound is practically always indicative of peripheral resistance in the respiratory organs; in fact, should always awaken suspicion of incipient tuberculosis; or of some thickening of the lung from an incomplete resolution of some prior pneumonitic condition.

In my recent experience the sign of ventricular flutter, both palpable and audible in the region of the apex beat and limited to the area bounded above by the third interspace and within by the left parasternal line, has opened a fresh and significant study of failing heart power peculiar, in my judgment, to an increasing proportion of the most strenuous of the world's workers and worriers, fighters, and players of present-day civilization. This fibrillatory disorder of ventricular function is probably one of the best danger signals of a failing heart, not so remote from a rather rapid decline to actual heart failure that postponement of radical measures can be allowed without the pain and pathos of an irreparable result.

The physical examination of the heart must be not only static—with the patient at comparative rest—but likewise and even more critically, dynamic; that is, an objective functional test for capacity is essentially of value. In this connection, as Krehl has pointed out, a labile heart frequency under the influence of such test exercises as forced breathing, stair climbing, body bending and twisting, and flexion and extension of the raised arms, generally points to myocardial weakness (myasthenia cordis) or valvular difficulty or inadequacy. Simultaneous disturbances of rhythm and arterial ten-

sion are correspondingly noted in many instances, the latter being generally diminished rather decidedly when the arms are raised.

Physical evidences of cardiac weakness are not infrequently explained by an antecedent or associated symptom-complex along leading lines which might be designated as the big four A's: Auto-intoxication (including acidosis); athleticism; alcoholism; anxiety. To these should be added as a very live and virulent cause chronic streptococcus infection, however minute and remote or obscure the focus may happen to be.

A final word pertaining to middle-aged men, particularly officers of the Navy, and our specific responsibility in detecting incipient physical signs of the cardiac affections to which they are peculiarly subject. Perhaps no better classification need be considered than that of Le Clercq (Paris Médical, Dec. 22, 1917). He recognizes three heart syndromes, namely, cardio-sclerosis, cardiarteritis, and cardiatheroma. The first condition occurs mostly in the 50's, and is due to dietetic errors, with alcohol as an adjunct, and also to acquired hepatic disease. High blood pressure and cardiac hypertrophy are rather typical of this condition, which later terminates in myocardial failure. Secondly, the sole cause of cardiarteritis is some infection, e. g., la grippe, common measles, scarlatina, typhoid fever, but mainly rheumatism and syphilis. Cardiac insufficiency develops slowly and is recognized particularly by the functional heart tests, along with more or less intermittent periods of mitral insufficiency of myocardial origin. The third group arises through slow intoxication, as by tobacco, lead, or alcohol; very often from sluggish colonic action and intestinal putrefaction. Murmurs, both aortic and mitral, may be detected in these cases; and complications are less prominent, violent, and imminent before senility occurs.

Here arises the concomitant importance of differentiating by physical signs between mitral insufficiency of direct, organic valvular causation and the relative mitral insufficiency of myocardial causation. Also a temporary mitral evidence of insufficiency that may be due to an infectious myocarditis or myocardial poisoning, elimination of which and recovery from which will be signalized by the disappearance of murmur, and therefore must not be confounded with myocardial insufficiency of more prolonged, constant, and profound nature and origin.

Given a history of habitual constipation, dietetic excesses, especially of meats and sweets, intestinal indigestion with colonic inflation, with or without disproportionate bulging and sogginess of the omental structures, a careful and rigid study and test of the cardio-vascular system is indicated. Slight irregularities in force, smoothness, and rhythm of the heart beat, ventricular fibrillatory pulsation and flut-

ter are not infrequent signs of a subtle undercurrent of disintegration of cardio-motor stability. A weakened first sound with marked increase in rapidity on slight muscular effort (tested) shows likewise diminished ventricular capacity and endurance; the pulse is correspondingly soft, small, and volatile.

We are now approaching a sort of balance of attitude relative to the differential effects and benefit or detriment of physical culture or health and physical training for competitive sport in special lines of prowess and excellence to which belong laurels, prize cups, being lionized, publicity, or a share of the gate receipts with secrecy and demoralization.

It is worthy of reminder that many a heart has literally been broken by athletic excesses, especially in those irregularly or severely trained who should earlier have been weeded out. Thus we have seen many prep school boys, raw, tender, immature in fiber and innate capacities of resiliency and reserve, aping their older brothers in college and laying a sandy instead of rocky foundation of cardiac staying power and continuity of developmental vigor.

I have yet to see a habitual or so-called moderate user of alcohol with a likely heart muscle and neuro-motor function. I mean moderation in the lay and insurance acceptation of the term, where the average daily consumption consists of two drinks of two ounces of whiskey. Often this is in the form of a cocktail before dinner or of one or two bottles of beer. Visible intoxication is rare. The damage is in the nagging depression and disorder of function due to the constant narcotization of cellular tissue and the annihilation of thorough or even intermittent elimination. The organs and tissues never get any rest from the alcoholic acceleration and excitation. The man who goes on a spree for a week once or twice a year and in whom a systemic revulsion with complete reaction through drastic excretion ends the metabolic crisis, is better off than the so-called moderate drinker who takes incessantly and inveterately his quotidian "eye-openers," "appetizers," "digesters," and "night-caps," and often between times his sociable "nip" and occasional treats at bar or table, and yet who to the casual observer never seems to be the worse for it.

IN CONCLUSION.

I wish merely to indicate the salient symptomatic lines along which incipient tuberculosis usually insidiously develops and likewise to point out the inherent suggestions toward a careful and precise physical diagnosis in relation thereto.

In a special experience of more than 20 years in tuberculosis work the symptom complex and objective signs dominating the purpose

of pulmonary physical examination might be grouped as the following:

(1) Bronchitic.
(2) Pleuritic.
(3) Laryngitic.
(4) Anemic.
(5) Auto-toxemic (metabolic).
(6) Myasthenic.
(7) Psychoneurotic.

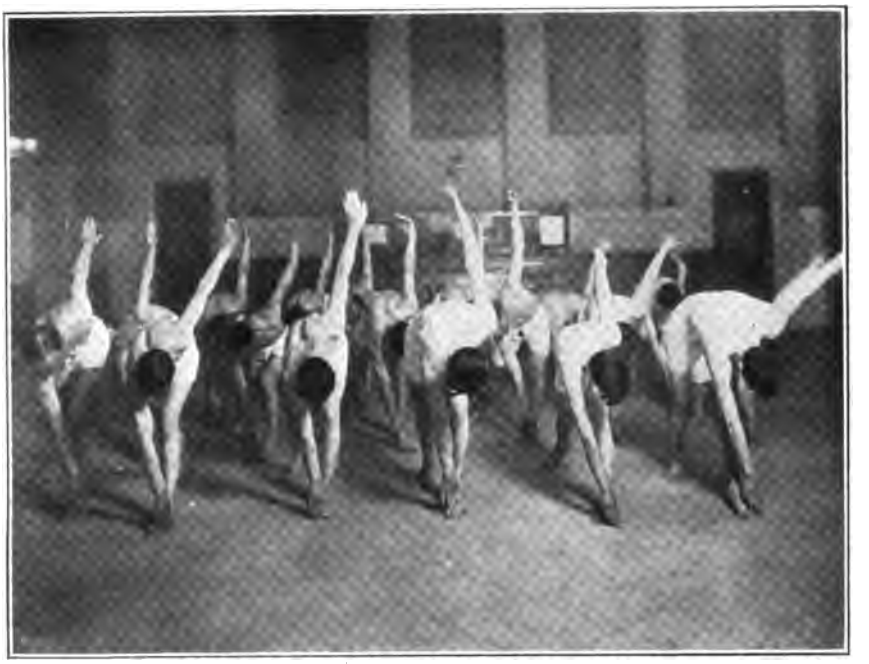
Occasionally, even in early cases of tuberculosis, the only prominent symptoms may have been either gastric or hemoptytic.

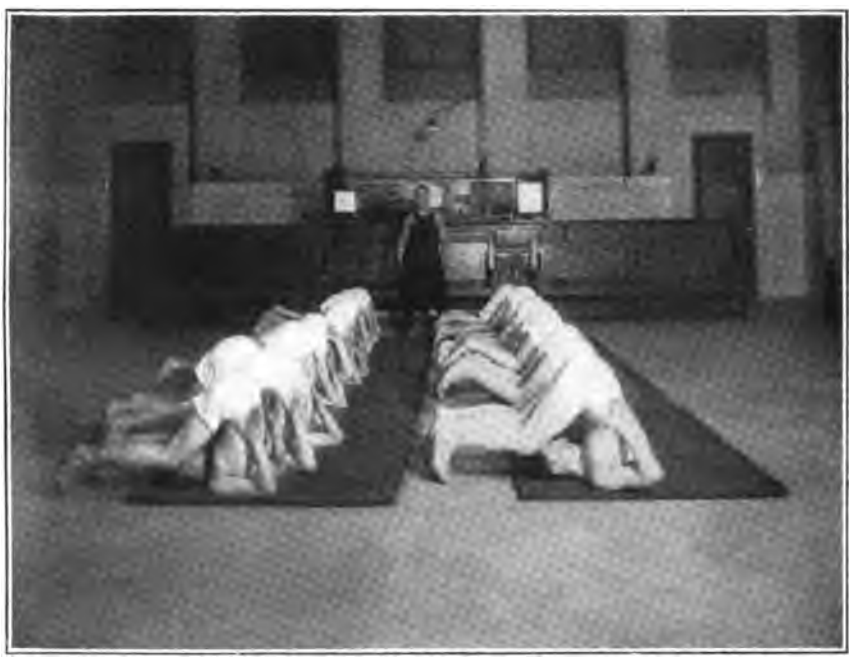
ATHLETICS AND THEIR RELATION TO WAR.

By D. F. Luby, Lieutenant, M. C., United States Navy.

The withering effect of the great war is felt all over the world. Like a huge plowshare it rips up the traditions of yesterday, turns over the moss and dust which for years have been accumulating within the institutions that are most vital to us and discloses fallacies and false prophets, bringing us face to face with the necessity for radical change in many departments of life.

The American system of athletics may be regarded as one of our national institutions, and through its channels pours the vigor of the Nation, but it is only at a critical time like the present that there can come a general appreciation of the sad fact that for years *athletics in America have existed only for the sake of contests* and that these contests have been developed, not primarily to upbuild the splendid youth of the land, but rather to satisfy the appetite for pleasure of a volatile and somewhat hysterical public. Twenty-five centuries ago a great nation had come to realize the full value of training its youth and was rewarded with victories which gave lasting benefits and led up to a high plane of civilization. For the first time in the history of America we are taught by the penetrating thrust of war the real meaning and the real value of athletics and we have a vision of what they might do for the thousands of boys, eager to strengthen their bodies, that they may give the best to their country. In spite of the time and the money devoted to athletics and the huge interest which this subject provokes now when physical strength and endurance is suddenly needed, we realize that we are not an athletic people, but a people of athletic specialists, and, because of the urgency of the situation, we see our armies attempting a rapid development covering a period of 6 months or a year when the period of development should have covered at least 20 years.





The athletics that count. Free physical training at Cornell Medical School for men rejected by Navy recruiting offices.

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It is the purpose of this article to draw attention to the fallacies of our athletic system as developed up to the present time, to point out the uselessness of the object sought, and to assert that there was no gain but rather serious loss to those who participated in athletics in the past. The plea is for a radical change in our methods and our objectives in the athletics of the preparatory school, the college, and the university.

In maintaining that our course has been at a tangent to the line of real athletic development it is necessary to look back over the past 40 years in this country. In the early days there were no gymnasiums, no athletic fields inclosed by wall or fence, and the most strenuous athlete of that period would to-day look with amazement at the Harvard stadium or the Yale bowl, which are nothing but colossal monuments to the present commercialization of athletics. In those days athletics consisted largely of friendly contests in physical strength between one half of the student body with the other half. There was no preliminary training, there was no huge financial budget requiring an adept business manager, there were no uniforms, no spectacular features. At a certain hour of the afternoon, moved by a universal impulse, books were closed, old clothes were donned, and there was a rush into the open to walk, run, jump, to let the physical man have his fling. With time came the development of teams and clubs, organized for the purpose of winning championships, both local and national. Schools and colleges began to taste the sweets of rivalry and to vie with one another in baseball, football, feats of the track, etc. Yale locked horns with Harvard and Princeton, Exeter fought with Andover, and everywhere college paired with college and school with school. The interest in athletics was not confined to the student body. The alumni and the general public soon became equally keen on the subject. Athletic events gradually became one of the dominant features of college life and many times a year the spectacle was presented of thousands and tens of thousands of people clamoring at the gates of our great playing fields, utterly regardless of the cost of admission or the time required and the distance to be traveled in order to participate in these gladitorial engagements. Wise young managers worked day and night to commercialize sport as winning teams brought prestige and attracted to the college the ambitious and enterprising youth of the land. Even towns and cities where there were no colleges became infected with the spirit of the times and, where local talent did not suffice to guarantee victory, athletes were imported from abroad for the purpose. In every form of athletics the object was the same, "to win," regardless of cost. Professionalism held our country in its grip and it required a crusade on the part of the public and certain of our institutions of learning to purge

our educational institutions of this taint. The restrictions imposed at college and the iron-clad rules about the participants in athletic events seemed to make competition more keen and, as a consequence, new plays of every sort were developed, new thrills crept into the games, athletic feats became more startling in character, and every year saw new records made and broken. By this time there was a need and an insistent demand for trainers and coaches. Athletic associations consulted with presidents, trustees, and faculty, maintaining that an alumnus or some incapacitated member of last year's team was not good enough to serve as coach. If coaches and trainers were to be used, they must be the best. Arguments were found for this in last year's defeats or the phenomenal career of some rival college, more prompt to take advanced ground along this line. And so there came to be a new profession, that of coach and trainer, and now training tables and southern trips and summer camps for preliminary training and expensive equipment and long trips to rival institutions and whole squads of coaches became a necessity. This all grew out of the determination to win, which would have been commendable enough had it not been accompanied by a feeling of utter indifference to those who fell by the wayside, or, in other words, to the thousands of boys and young men who could not be admitted to the arena, whose physical proficiency entitled them only to seats on the bleachers as spectators.

The athlete has now become the real king of the college world. All those who love good sport watch him and follow his example. He feels himself an essential and integral part of the school and trains faithfully, punishes his body, makes every sacrifice, strives with superhuman strength to accomplish the alloted task and retain for as long as possible the halo of respect and admiration which victory brings him. He is too young to realize what the career of college champion involves in the way of disaster to his body, and perhaps would care little for the threat of future disaster, so long as he could stroke the winning crew or, as pitcher of a winning nine, hear the delicious music of applause from a vast assemblage of admirers. Nor does the coach care, nor the student body, nor the college. So long as he is good for a point or a run or a goal, he is applauded. When he fails, his usefulness is over, and he is discarded and forgotten.

One of the most serious faults of our present athletic system, a vicious, pernicious system if ever there was one, is the necessity for haste. Our trainers work feverishly and anxiously to develop a winning team. They must develop such a team at all costs because failure means the loss of a job. A certain Harvard coach has said that coaching a football team is simply a race against time. The coach whose team meets, for preliminary summer training, in August has stolen a march on him whose team does not assemble until September.

The first reform in athletics related to professionalism; later there was a less radical reformation. People began to ask if the college athlete did any studying and passed his examinations. A disposition now appeared to shorten long southern trips, to abbreviate the preliminary training season, to raise the standard of scholastic requirements. In some sections there was a reaction against the coach and the trainer, and every evil that had crept into athletics was laid at the door of these men, when the real fault was within the college walls and could be laid at the door of the faculty and trustees and students themselves, for from all these elements the demand was consistent and unvarying. All clamored alike for a winning team.

It is small wonder that our athletic coaches disregarded the great mass of potential athletic power, allowing it to be idle in the bleachers, and concentrated its efforts on the few who gave promise of unusual accomplishment. I have seen the late Mike Murphy work for hours with his star high jumpers, endeavoring to perfect their scissors-like form that they might add a trifling fraction to their 6-foot 4-inch record. How much more profitable to the country had this greatest of all trainers developed instead five hundred or a thousand young men of moderate athletic ability to jump 4 feet 6 inches. Had he succeeded there would have been that many more men available to go over the top and stand the awful strain of battle after they got over. I have seen Johnny Mack coach his six or seven hurdlers as they skimmed over the 3-foot 6-inch sticks. Again and again would they pass in review before him in the effort to attain that perfect form without which they could not win. How much more advantageous to the country to-day if he had coached six or seven hundred Yale men to hurdle those timbers, even if they did not acquire the form which he so well imparts; and so it is with the coaching in all departments of our college athletics. In the mad rush for victory the mass of the students is neglected for the sake of developing a specialist or group of specialists. The university, like the preparatory school, rewards the efforts of these fortunate men with all the honors at hand, and it is the least that can be given them in return for the real sacrifices they make.

It is a well-known fact that the body accommodates itself quickly to all manner of changes, and this is perfectly true in the case of the boy who, looking forward to a university career, begins to specialize in some line of athletics while still in a high school or grammar school. Thanks to this adaptability he is not conscious of the deleterious effects of strain and has no hint of the brewing trouble during his whole scholastic career, nor when he leaves the university does he appreciate that he should continue to take exercise and, as it were, retrace his steps, along the route already trod, by taking active

Views on American transport. The men are thin and in some cases seem overtrained.

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their features are in repose the expressions are haggard and anxious, and those who are laughing are thin and seem trained "too fine." Many had lost weight and others declared that they had been conscious of a distinct decline of vigor during the last month or two of their training. These statements were particularly frequent and emphatic among the men who came to the sick-bay with different zymotic diseases. During three trips there developed on the *President Lincoln* 50 cases of pneumonia, 34 of scarlet fever, 85 of influenza, 68 of measles, 56 of mumps.

In view of what lies ahead of our men in Europe one can not but feel that they have been brought along too fast and that they are stale before they have begun the game, and yet in the face of the urgent need for men how can the Government do differently? The invalidism and the deaths in our Army that result from epidemic diseases may fairly be laid at the door of military unpreparedness and the lack of a general, properly thought out system of physical training for our young men, calculated to make them hardy and capable of increased resistance to infections.

The immediate indication is to impress upon physical directors, trainers, and athletic managers in training camps the importance of deliberation and moderation and of working in harmony with the medical officers. In all our training camps, and more particularly at our aviation schools, a carefully regulated diet, plenty of sleep, and the avoidance of alcohol are matters of prime importance. However imperative it may be in this acute and trying situation to resort to short cuts and temporary expedients, the present national emergency should serve not to confirm us in bad practices too long in vogue, but rather to draw us out of our stagnation and indifference to the reform of every abuse. There is a sense in which, no matter how brilliant the victories of our armies, this country will suffer defeat unless self-questioning and self-criticism lead us to mend our ways in regard to the many vital particulars in which we are now at fault.

With the lesson of the hour before us it seems beyond belief that the country should not already have taken steps to improve the physical condition of the sons of this generation, who will be the men of the next and the future protectors of our cherished institutions. It seems to me that one has a right to demand Government supervision of some systematic program for the physical development of the boys of the country. If we are to have athletics following in a general way the old lines then we should eliminate the now essential idea of wining games at any cost. The coaches at the various schools must be forbidden to concentrate their attention on the few specialists to the disregard of thousands of students who now merely stand upon the side-lines. There must be 20 football teams playing on the fields

where now we see but two. Instead of half a dozen men training to jump a broad jump of 22 feet 11 inches we must see 600 boys learning to jump 11 feet 6 inches. The length of races must be reduced and cross-country runs must be reduced both in length and in running time or thrown out altogether unless a slow jog trot is enough. The rowing races must be cut down to the Henley distance as a maximum and then there must be 20 or 30 crews practicing daily instead of 4 or 5.

In a word, all branches of athletics must be reclassified on the basis of their effects upon the heart and other vital organs, and we must discard the old classification based upon popularity and commercial advantage. In the grammar school the form of athletics to which a boy could be assigned or in which he would be permitted to engage in would depend upon (1) his family history; (2) his personal history, having regard especially to previous illnesses endured; (3)his physical status; (4) his particular type, height, weight, etc., in relation to age, etc. Every class would have its specially prescribed athletics, both physical and tactical, and under no circumstances would a lad be allowed to engage in competitive sports assigned to a class above or below his own. A physical examination would mark his entry and exit from a class and he would be marked for development of body and for ability to perform the various tactics. While in the grammar school a chart would be begun for him which would accompany him throughout his educational career.

As the boy passed on to the higher school there would be a reconsideration of his individual record and his family history. A physical examination would take place, and his chart and previous athletic work would be considered. There would be athletic classes and all members of a school or college would participate except when exempted for physical disability. The alert boy, the natural athlete, would have to be held in check, just as the laggard and lethargic would have to be stimulated, in order to maintain for the class an average of efficiency. Outside competitions with other schools would be reduced and the competitive idea find its illustration principally in interclass games. Work in the gymnasium should accompany and parallel the work done in teams and athletic games. Where students show beyond all reasonable doubt a real and permanent improvement in body and an increased ability to participate in various branches of sport they should receive credits at the hands of the college authorities in the same way that credits are given for scholarship. All athletics of the more strenuous type and all those contests which inevitably induce even temporary exhaustion must be abolished. Mass competition, such as that in which a class would participate as a whole, is to be encouraged. New feats of prowess should be introduced. There should be walking contests, well-scal-

ing contests, obstacle raising, hurdling, shorter relay events with increased personnel, more soccer football, shot putting with a lighter shot, etc.

The athletics of to-day must be remolded and their object clearly defined. Athletics can surely have no better purpose than to develop a robust and healthy boy who, though he may not be an interscholastic champion or sought after by the larger colleges as likely to increase their fame, will nevertheless enter upon his life work with a symmetrical, fully developed body, capable of resisting disease and of enduring physical strain. For such a young man the training camp, the transport, and the trench will not contain the threat of death from disease before his grapple with the enemy.

MEMORANDA FOR MEDICAL OFFICERS WHEN A SHIP IS COMMISSIONED AND SUBSEQUENTLY.

By A. Farenholt, Captain, M. C., United States Navy.

This list of duties has been compiled primarily for the use of those going to sea for the first time, but may be of service to others as well.

When the ship is fitting out the medical officer shall examine sick bay and spaces under his charge in accordance with article 2101–I.

As soon as possible he shall examine the crew and (1) verify descriptive lists; (2) ascertain if all crew are properly vaccinated, if not vaccinate those needing it when permitted by commanding officer; (3) ascertain if all crew fully qualified physically. (See article 2102 and 3–I; also 2101 to 2131–I, 2901 to 2997–R., 1303–I, 1351–I, 1357–I, 1504–I.)

CLERICAL DUTIES.

The following work should be started and these books commenced:

1. Filing cases established for all letters, indorsements, bills, vouchers, inventories, invoices, copies of returns, and other sick bay work; all classes of paper work are numbered serially beginning with No. 1, July 1.

2. Property record book or file sheets or card index.

3. Book recording receipt of all health records, also forwarding of same; contains names alphabetically arranged and numbered with corresponding number in pencil on health record. This book may advantageously contain also typhoid and smallpox vaccination data.

4. Prescription book; numbers and dates.

5. Linen and laundry book.

6. Sick bay recorders book; this may also be the rough journal and ward book.

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7. Venereal prophylaxis book, or binder for holding liberty lists.
8. Memoranda of interesting cases.
9. Book recording articles wanted and articles for which a survey will later be necessary; one side for wants and other for articles for survey.
10. Book recording operations or rough Form P kept.
11. A filing box or boxes for rough Form F cards.
12. Venereal lists made out; copies for executive office and dispensary and for man who has venereal duty.
13. A full supply of blank forms laid in and conveniently stowed.
14. Slips provided for report to commanding officer "not in line of duty"; article 2902–1–R. complied with.

OTHER REQUIREMENTS AND SUGGESTIONS.

1. A pigeon-hole locker having about 30 compartments and locking arrangement for health records.
2. Instruction for Hospital Corps started (see 2642–1–5–I, Vide No. 83); Handy Book for Hospital Corps, 1917, United States Navy; Mason; lectures; dummy operations, paper work and forms; Hospital Corps drill regulations; optional; Instructions for Medical Officers, 26.
3. Arrangements made with paymaster for food for patients in sick bay; diet slips for commissary steward.
4. Liquor, poison lockers examined carefully; also stowage of all stores either in stores or on hand in sick bay and dispensary, 2964–2965–R.
5. Hospital Corps billeted and arranged in beds and lockers; hammocks and mattresses to master at arms.
6. Hospital Corps find their messing arrangements, also method of drawing clothing, small stores, and money, 2130–I.
7. General station and duty bill made out and posted:
   (1) Sick bay watches.
   (2) Stations at various drills.
      1. General quarters, Manual Medical Department, Chapter X; 2109–I.
      2. Fire, 2707–5–I.
      3. Abandon ship.
      4. Battalion drill.
      5. Landing party, Manual Medical Department, Chapter X, section 3.
      6. Collision drill, Manual Medical Department, 982.
   (3) Cleaning stations.
   (4) Liberty lists and rotation for duty as sick bay recorder.
   (5) Routine for sick bay and medicine hours, poison antidote list.

8. Operating room inspected; sterilizer tested; instruments and appliances inspected and placed in order; habitually kept coated with cocoa butter, liquid paraffin, or other method to prevent rust. Table, water, lights satisfactory. This room must not be used for bacteriological or other work.

9. Application should be made by letter for microscope and accessories and upon its receipt preparations made for all ordinary work; an incubator may easily be improvised.

10. It is desirable if possible to obtain an ice box; sera, vaccines, certain foods, etc.

11. Metal feeding and dressing trays may be improvised for use across bunk bars; also same for cups and glasses.

12. Do not send officers to hospital without survey.

13. Weekly inspection of holds, storerooms, and living spaces made with first lieutenant and written up in hull book or letter to commanding officer, 2701–4–2702–2–I, 2115–I.

14. Bill of health always secured before leaving port; unless flagship directs otherwise, 2126–1–2–I. Also meet health officer at gangway, Manual for Medical Department, chapter XV.

15. See that Hospital Corps are always in proper uniform, rating marks applied, clothing regulation pattern. If possible have all sick bay attendants wear white washable clothing. See that uniform is sufficient in amount and properly marked according to Uniform Regulations 1913, 70–71–72.

16. Keep smallpox vaccine and such other vaccines and antitoxins as may be necessary on hand. The flagship sometimes has such stores.

17. Purchase as little extra food for use in sick bay as possible.

18. Inspect bumboats constantly (if any); especial care about bottled waters; mosquitoes in bunches of bananas and in shore boats, 2113–2–I, 2618–2–I.

19. Be prepared to examine water from shore for boilers or drinking, the latter is absolutely necessary, 2621–I.

20. Submit memorandum slip in each case in which admission to sick list is not in line of duty; 2902–1–R; Manual Medical Department, 2254.

21. See that all heads are clean; properly flushed; papers; live steam used to clean if possible; basin to wash hands after using heads if such can be arranged.

22. Carefully inspect prisoners; acute, feigned or communicable disease, 1431–R. Fracture of skull possible in those dead drunk, 2114–I.

23. See that medical boat boxes are O. K.; covered with canvas, marked with ship's name and medical department. Also medical packet in regular boat boxes.

24. Arrange battle dressing packets for isolated positions, turrets, etc., fire and engine rooms, steam and motor boats: these may be tin boxes or canvas-covered packages, well marked. Reserve dressings for use after action should be provided in the same way.

25. See that stretchers are instantly ready for use, some permanently fitted about the decks for use in accidents, such as at coaling ship and handling of stores.

26. Keep constantly on hand dressings and appliances for use in case of accidents, such as burns from fireroom or powder, fractures, restoring the apparently drowned, or those overcome from inhalation of poisonous gases.

27. Determine the best method of removing the wounded from the fire and engine rooms, turrets, handling rooms, tops, and all inaccessible places.

28. Observe regulations concerning locking of storerooms, closing of storeroom and other doors at certain times—sundown at sea; drills—keys never to be taken out of the ship. Keys in hands of enlisted men, 2964–R., 1504–2–I.

29. Cotton or other ear protectors furnished all persons on board during times of firing of great guns. Care about ears in swimming in tropical waters.

30. Barber should be instructed in method of keeping his gear in sanitary condition. List furnished him (not posted) of all syphilitics.

31. See that food is O. K. in quality, quantity, cooking. Dishes washed properly, disinfected if necessary. Syphilitics with open sores have special gear. See that those who eat at irregular hours are properly looked out for 2618–2–5, I.

32. See that wash rooms are in a sanitary condition and men do not urinate while under showers.

33. Prohibit use of tube in water breakers, notably in steam launch. See that scuttle butt is working in satisfactory manner and water cooled and aërated.

34. See that men are billeted properly and not in dangerous places and exposed; no sleeping in storerooms or unauthorized places.

35. Have a landing party scheme always worked out and ready to be put into operation. Instructions for Medical Officers, chapter X: Inspected by flagship twice each year. Material to assemble: Instruments, drugs, dressings, diagnosis tags, transportation.

36. Prepare a schedule of routine and incidental returns in order to facilitate such work as per article 5222–5–I.

37. See that ship's laundry is conducted in a sanitary manner; all infected sick-bay wash to be disinfected before leaving sick bay.

38. If ashore see that a proper place is selected. Inspect carefully entire crew, stripped, at intervals, for early, concealed, or unrecog-

nized disease, especially in cases of men whose duties confine them below decks; especially look for T. B., no cases of which may remain on board longer than can be helped. In port land them in hospital; at sea in tent on deck: in some places a tent on the beach.

39. Careful to *retain copies of all correspondence* and paper work; especially invoice of medical outfit and all invoices received subsequently.

40. Keep commanding officer informed concerning dangerous or infectious diseases, deaths, important happenings, sanitary condition of port, 2952–3–4, R.

41. Report to officer deck, deaths, accidents, receipt of stores, and all affairs which should be recorded in the log, 1807–3–(c)I.

42. See "Ship and gun drill United States Navy, 1905" for aid to wounded, page 17; casualties, 104; general quarters, 276; medical department in battle, 279 (same as chapter X, Manual for Medical Department).

See "Landing force and small-arm drill—1912" for first aid, 35–72, esp. 63; tent pitching, 75–83; sinks, 72; urinals, 73; kitchen pits, 73; water supply, 77, 69, 16; position hospital tents, 75; men's equipment clothing; position ambulance party; packing knapsack haversack, 22; at battalion drill, 474; officers' equipment, 19; position staff battalion, 473; ambulance party, 17; position staff regimental, 492.

43. Guard against disease brought by animals from ashore.—c. f. plague by rats; also pets on board ship.

44. Recommend anchorage away from shore in infected ports; flies, mosquitoes from beach, in bunches of bananas, sacking, closed boats; sweep out canopy cover of steam launch; care about breeding places on board for mosquitoes.

45. Guard against lead poisoning, gas poisoning. (See circular letter M. & S. 124713, Mar. 23, 1912, 3327–1–2, I.

46. Guard against infection by syphilis by band instruments, whistles (boatswain mates, officers' deck), all cooks and mess attendants and dentists.

47. Watch for and detect presence of cocaine and other drug habits.

48. Restrict liberty in ports having much sickness; also restrict venereal cases.

49. Swabs and spitkids washed and disinfectants used.

50. Repair at once breaks in surface of linoleum covering of iron decks.

51. Air bedding and contents of bags as often as possible; a maximum of sunlight and fresh air.

52. Cubic capacity of the various spaces in the ship should be known; or know how to determine, for use in case of disinfection.

53. Before a target practice all qualified and acting gun pointers examined as to visual acuity; result entered in gunnery record, 2501–3–I.

54. Surgeon's report at quarters should not be a perfunctory one, but he must have an actual report from the sick bay as to the result of the muster of Hospital Corps and sick.

55. Hospital Corps to have no matches other than of the safety pattern, 2607–15–I.

56. Regulations concerning standing lights in sick bay and spaces must be observed, 2607–2–I.

57. Before going to sea secure sick bay for rolling and collision.

58. Use of harbor water, 2621–I. In infected ports.

59. Formulate scheme for coping with contagious disease; a few cases; many.

60. See that all spaces in ship are ventilated in best possible manner.

61. Manual for Medical Department, page 193, suggests white clothing when thermometer 75 at 8 a. m. Bathing not allowed if water below 70.

62. See that proper awnings are spread in ship's boats and on deck.

63. Mud to be cleaned from anchors and chains when in infected ports. Cleaned overside, not on deck. Instructions Medical Officers, 80–12.

64. Mosquito nets for camping parties in Tropics.

65. Patients suffering from mosquito-borne diseases to be screened.

66. Disinfection of ship, see Manual for Medical Department, page 206.

67. Patients transferred to hospital require—

1. Hospital ticket.	From medical department.
2. Clinical card.	
3. Health record.	
4. Clothing list made out.	
5. Efficiency report to Medicine and Surgery.	To Bureau of Medicine and Surgery.
6. Card, transfer of hospital corpsmen.	
7. Conduct report.	From Executive and Pay Office.
8. Service record.	
9. Gunnery record.	
10. Pay accounts.	
11. Receipt.	

68. Chief pharmacist's mate to keep on hand rubber pillowcase in which to place health records and other valuable official papers in times of danger, abandon ship, fire.

69. No smoking in sick bay, 2625–2–I.

70. Instruct chief pharmacist's mate and other hospital corpsmen just what medicines they are allowed to give and what not without orders from a medical officer. See that they understand fully the danger of carthartics or opiates in cases of beginning appendicitis or other abdominal trouble. See that they understand fulfillment of the various poison conditions and artificial respiration.

71. See that water is not wasted in the sick bay.

72. Isolation ward always ready for service.

73. Hospital Corps instructed as to the proper way to pack knapsack, haversack, blanket, and as to wearing equipment.

74. Designate proper place for stowage of cleaning gear.

75. Medical officer should know if any man aboard has been confined to ship for period longer than 30 days for reasons for which the medical department is cognizant, sickness, venereal; this question asked on admiral's inspection, limit 12 days by art. 3670–R.

76. Marine's "gold medal" cots useful if extra beds are necessary.

77. Mattresses may be dispensed with in isolation ward and parts of sick bay; men using bunks supply their own mattresses and place them on canvas covers over spring bunk frame.

78. Preparations must be made for the safety of insane patients.

79. In case deserters are surrendered on board they must be physically examined and Form 21 made out and sent to executive officer.

80. When enlisted men are condemned by Board of Medical Survey in the United States owing to causes not incident to service their transfer to another station or place for discharge shall not be recomended, 366–R.

81. Health records should be written in ink.

82. If medical officer is president of board of medical examiners he orders the new health record to be made out, 3257–1.

83. Regulations for instruction of officers, 2641–1–3, I; of Ambulance party, 2956–R.; of Hospital Corps, 2642–I. (Vide No. 2.)

84. Care concerning inflammable stores, 2707–1–5, I.

85. Care taken with venereal prophylactic treatment; instruction concerning danger; information circulars, lectures, circulars issued by bureau; posters on bulletin board; punishment for offenders adequate; educational and moral prophylaxis.

86. Use whole (complete) name in official correspondence relating to enlisted men.

87. Keep vaccination of men up until at least three times; no probability of danger. See that all hands have typhoid vaccination.

88. A portable electric lamp is useful in sick bay bed cases, also operating room, also store-rooms. An electric hand torch is useful in bedside work.

89. See red cross instructions, 3861–R., Geneva Convention, Manual Medical Department, chapter 26; Hague Convention, Manual Medical Department, chapter 26.

90. Patients transferred to other than United States Navy Hospitals, 2962–1–5, R.

91. Sick bay sweepings, dressings, etc., taken in bundles to fire rooms and burned. No boxes or anything thrown overboard without permission from officer of dack. Nothing thrown out of ports

92. Ports not to be opened when closed by proper authority (especially at sea) without permission from officer of deck and medical officer.

93. Whenever an officer leaves ship (detached) his room should be carefully cleaned and painted, if mattress is old it should be condemned.

94. A high physical standard for applicants for the various fireroom rates should be held.

95. Be prepared to embalm and bring into port bodies of dead.

96. Great care about "Line of duty" in cases which may possibly become pensionable; safeguard the Government. State all facts very fully.

97. Articles surveyed and ordered to be destroyed should be so destroyed or clearly marked "not on charge." Metal objects marked by file; this to prevent confusion in inventory of articles on charge.

98. Investigate health conditions immediately on arrival in port; also keep posted throughout the ship's stay, safe anchorage, etc.

99. Arrange for the removal of infectious cases to hospitals ashore or tents on beach unless against the best interests of the patient.

100. If scuttle butt has not sanitary terminals keep cup immersed in formaldehyd sol., 1–2500.

101. The United States Public Health Service recognizes as quarantinable diseases cholera, incubation period, 5 days; yellow fever, 5–6 days; smallpox, 14 days; typhus fever, 12 days; plague, 7 days; leprosy, (?) days. State laws impose additional restrictions and quarantine, Manual for Medical Department, chapter XIV.

102. In a port where there is a Marine Hospital (United States Public Health Service and no naval hospital) patients may be sent to the former for treatment by application to authorities in charge; arrangements have been made to that effect by Bureau of Medicine and Surgery, charge 30 cents per day, and at contract rate when hospital is not owned by the United States.

103. Dental work, especially if done by other than commissioned dental surgeons to be carefully supervised, prices, kind of work.

104. Spitting about the decks and ship must be prevented.

105. Visitors must not be permitted to interfere with the work of the sick bay; loafing prevented.

106. The executive's office must let medical officer know of all changes of rating. As soon as a man is received on board his name must be sent to the medical officer; name is then entered in health record index book with date of arrival; the health record itself may come later. All persons transferred from the ship must be reported to medical officer for same purpose.

ENDOCRINE MANIFESTATIONS.

By S. G. Strauss, Lieutenant, M. C., United States Navy.

In this day of mechanical supremacy we are unfortunately too prone to forget that the human body is not a machine.

Under the spell of surgical domination the clinician is all too apt to forget that pathologic events, both objective and subjective, are not static events. He is all too apt to forget that ever-changing flow which spells biologic life.

Are we not all too smugly content to regard a case of measles, for example, as a mere succession of nasal catarrh, Koplic spots and an eruption which is characterized by this and that feature? Regarding the case of measles as something definite, clear cut, static, do we often enough consider such a case from the angle of the individual so affected? Do we often enough regard such a case of measles as a particular case belonging to a particular individual? Is it not our habit, too, having become acquainted with definite disease pictures, to attach to those pictures in our practice the individuals who come to us as patients? Do we often enough—do we ever—consider that a particular individual presents to us certain symptoms which in their entirety spell whatever our final diagnosis may be?

In the case of measles we have become too accustomed to the statement "All children have measles at some time." Stop and ask a moment "Do they?" Of course, the answer is a most emphatic "no," but why?

It is going to be my attempt to at least show the need of recognizing with more clarity than has been our custom the individual's part in this pathologic world. We are confronted by the questions: What determines the individual's liability to certain pathologic states, and secondly, how are differences in the course of such pathologic states caused?

Anatomy is not fixed and permanent, nor is physiology, nor environment, nor heredity, nor pathology. By the latter I mean states of illness. Surely every human being differs from his fellow externally and so more surely differs in the forces that have gone to cause apparent differences. It should be our attempt to find how in-

dividuals differ so widely and in that answer lies the answer to the question of the variation in disease states.

If individuals are so unlike physically and mentally, surely their illnesses are quite unlike in occurrence, in character—in all that is basic. How wrong it is of us to talk of a "case of measles." How much further our medical art would have come had we paid more attention to the distinguishing features of each individual who at some time presented the symptom-complex which we, for convenience sake, have labeled "measles." Would we not now be better able to recognize in measles more than a skin eruption, which falls within certain descriptive limits? Would we not now perhaps be able to prophesy where reasonably we should find measles—to prophesy which individual is liable to measles?

Had we paid closer attention to individual differences—had we looked deeper into the reasons for these differences, would we not be better able now to understand the vast army of unlabeled clinical states which we each day in our practice meet, which we curse in our ignorance to-day, using a curse word all our own, "neurotic."

Gradually there has crept into our medical teaching the dictum, "Study the patient" or "treat your patient." This is carried out in a mechanical way. The microscope, the Roentgen ray, and the test tube are king. We must believe but what is printed on the laboratory slip and through these facts we are led to one conclusion—a pathologic anatomic diagnosis—static—whereupon the individual, the patient, is forgotten and the organ treated in a static way.

There is another path which we can follow. The picture that is presented by the cretin is too well known to warrant description here. Likewise, the pictures presented by fully developed cases of exophthalmic goiter and myxedema. We know that the remarkable psychic and physical phenomena manifested by these individuals are the result of a disturbed thyroid gland function. They are completed pictures. Latterly, we are talking a lot of the "Forme Fruste." That is a step forward, but why not look further ahead. Study many cases—well developed—of thyroidal disbalance; note in exact detail the characteristic marks; determine which of these marks are constantly prominent in these cases and then remember them as thyroidal marks, signs of a thyroidal disbalance; no matter where seen or how unexpectedly, for example, the dullness or glossiness of the hair, the dullness or brightness of the eye, the sluggishness or vivacity of the cardiovascular system. Do that in disturbances of all the glands of internal secretion and shortly you will have physical marks dependent on those endocrine glands, which I believe determine to a very great extent the individual's physical marks, his mental marks, and so his life history. In such a way, study your patients.

Reversely, study carefully the history of all your cases with special regard to past infections and so determine the individual's future liability or immunity to the infectious diseases. To make my ideas more tangible, I will illustrate. I shall present a case history analyzed for subjective and objective endocrine factors. Many of these have no experimental proof but rest on a foundation of repeated clinic observation.

Mr. L., married, age 29, a Russian, manager of a large factory, presented himself for examination on December 5, 1917, complaining of "indigestion, constipation, attacks of weakness and dyspnea." He further stated that the attacks of weakness and dyspnea came every four or five weeks, always following a meal, and that the first attack came in September, 1916. The indigestion consisted of a frequent sense of oppression in the epigastrium associated with nausea and tasteless eructations. The constipation, too, dates from September, 1916, being fixed, the bowels acting but once in three days, and then the stool being small and hard. The first significant fact for me in this is the man's career; it means a man of will, and courage, and untiring energy, for having come from Russia a few years ago penniless, he is, at the age of 29, the manager of a factory in New York City. A parallel fact is that feeding guinea pigs adrenal extract makes them more pugnacious. One knows that courage and will and the desire to fight are masculine traits, male sex characteristics in fact, and these male sex characteristics are under the domination of the adrenal system. Is it not fair to assume, then, that the patient is one in whom the adrenal system is prominent?

He gave the history of having been in an accident on May 30, 1916. He was caught between two street cars, thrown to the ground, sustaining a fracture of the left humerus. After his fall he was unconscious for three hours. His convalescence ended August, 1916, with a return to work in September, and shortly thereafter his present symptoms made their appearance. Of course, Crile has shown conclusively the direct damaging influence on the adrenal system which is possessed by mental and physical shock. So we may fairly presume that, whatever other damage the accident sustained by the patient effected, it made it necessary for him to meet an adrenal crisis. This was met successfully for the time being.

Three months later, upon resuming his work, which called for an increase of nervous and physical energy, such energy being made possible by an evenly balanced adrenal system, he developed certain symptoms. These symptoms were at first diagnosed by a general practitioner as "nervous indigestion," and after a period of unsuccessful treatment the patient was referred to a neurologist. The patient might have been transferred to the attentions of a gastroenterologist had the usual custom been followed, which gentleman

would have laid special emphasis on stomach tubes, gastric acidity, and lavage.

It happened that I considered the case one of delayed adrenal insufficiency, the immediate symptoms being explained on the basis of disbalanced splanchnic sympathetic tone, due to a change in the usual adrenal system coefficient.

Facts which lent weight to my hypothesis were brought out by further examination. The patient stated that his father had died at the age of 59 of apoplexy. I think there can be no doubt but that individuals who show high blood pressures and the usually associated degrees of arteriosclerotic vessel changes may be considered as having adrenal systems of unusual activity. So he received an adrenal heritage and through the male side, which emphasized the fault. In my physical examination a number of facts stood out as indicative to me of the patient's adrenal temperament.

I warn the reader that there is no laboratory proof of this, but there is the strength of a continuous repetition behind them. Signs which in many other patients have come to possess an adrenal significance I made out in this instance, and I will point them out.

The patient was a heavy-set, dark-complexioned male. The forehead was narrow and sloped sharply back from the bridge of the nose. I might state here that in most individuals exhibiting the pituitary temperament one usually finds a broad high forehead, due in part to the pituitary effect on bony growth, but I feel that the narrow retreating forehead of the adrenal individual is equally due to the reduced size of the anterior portion of the cerebrum. The hair of his head was black and coarse. It had a low implantation on his forehead in front of his ears and from the nape of his neck, and the hair line was not sharply marked. The eyebrows were heavy and broad, and were joined over the root of the nose by a fairly well-marked hair fringe. In spite of this profuse hair growth over the head that over the body was disproportionately scant and the pubic hair tended to the feminine type. Over the sacrum grew a lot which may be considered a poor prognostic sign. I consider the disproportion between the head hair growth and that on the body very significant, poitning to an adrenal fault. It has been shown by guinea pig feeding that both skin pigment and hair growth can be to a degree controlled by adrenal extract.

The patient's eyes were prominent, the pupils wide and slow in reacting to light. Of course it is known that the intravenous injection of adrenalin into animals causes the same changes in the eye as follow the stimulation of the cervical sympathetic nerve—that is the retraction of the eyelids, protrusion of the eyeball, and the dilatation of the pupil.

The patient's ires were pigmented dark brown as was the skin of the entire body. I have found that this pigment is an adrenal sign. The pharynx showed a slight congestion. The ears were somewhat cyanosed, and the complexion, though sallow, was flushed, all facts pointing to a poorly stabilized vasomotor system, which in part is under the control of the adrenal organization. The thyroid gland showed no enlargement.

The vasomotor reaction on the skin, or, in other words, the capillary reaction to a mechanical stimulus, was of very poor quality. In this connection I might say that this reaction is obtained by rapidly drawing a blunt instrument over the skin's surface, exerting slight pressure. In a normal reaction within the limit of five seconds a pink flush appears along the course of this stimulation, which immediately fades into white, carrying along its borders a fine pink halo. The factors which vary are the speed of the appearance of this capillary dilatation and subsequent contraction, the duration of this visible reaction and finally the proportion between the contraction area or white part and the dilatation area or pink part.

It has been my experience to find in normally balanced patients a fairly rapid reaction within 5 seconds, the entire line fading within 20 seconds, the dilatation merging into contraction slowly with no disproportion between the white and pink parts. In subjects who are extremely thyrodial this reaction appears too rapidly, fades too rapidly, and shows an excess of vasomotor dilatation or pink. In adrenal subjects the reaction is slower than normal. There may be no initial dilatation along the course of the stimulant, but immediately one sees a line of contraction surrounded by a pink zone, the white portion, however, being disproportionately prominent. In extreme cases a wheal forms along the course of the instrument used.

In this connection it is interesting to recall the brilliant therapeutic results which are obtained at times in cases of urticaria by the subcutaneous use of adrenalin.

The patient showed a very poor vasomotor reaction, inasmuch as its onset was slow and showed both poor vasomotor contraction and dilatation. Fading took place too quickly. But, after an interval of nearly a minute, the entire phenomenon was repeated but with an entirely different character. This secondary reaction showed a very prominent contraction zone slightly raised above the skin's surface, bordered with a fine dilatation zone. I might say that this is the only time that I have seen such a delayed reaction. I here took it to mean an extremely poor regulation of the vasomotor nerve supply and on account of its final adrenal character I placed the blame on that member. The pulse rate was 60, the rhythm regular, the blood pressure

was 100 systolic, 80 diastolic. This low blood pressure can easily, too, be attributed to some adrenal fault. The heart showed nothing unusual, nor did the lungs. The abdomen was somewhat obese, rather globular in shape. The reflexes were present and equal. The abdominal wall was held rather rigid. No masses were made out. The liver and spleen did not show any enlargement. There was some slight tenderness in the epigastrium.. There were no changes in the skin sensibilities of the abdomen. The extremities showed reflexes active within normal limits, and equal on both sides. The hands and feet were somewhat congested, almost cyanotic, and were cold. This fault, too, I took to mean some weakness in the vasomotor regulation.

Subjectively, the patient presented nothing beyond what I have already noted. His words were:

> Once in four or five weeks after meals I find I can't catch my breath, and I get weak. I become nauseated but have no vomiting. Such an attack lasts for about two hours. I think that it has in each instance been caused by the ingestion of fried fatty food or shell food. I have no actual pain with it, but feel a great pressure in the center of my abdomen. I have had three attacks in all, but since my accident I have been constantly troubled with much eructation of a tasteless gas, associated with abdominal distress after meals. This distress comes on immediately after meals and lasts approximately an hour. Associated with this has been a positive constipation, my bowels not moving but once in two or three days.

Further questioning revealed no other subjective features.

I analyzed my patient in the way outlined above, disregarding his symptoms. Everywhere I found facts pointing to some disturbance in his adrenal balance, and, still disregarding his complaints, I set myself the task of regulating his adrenal balance, which I felt sure was at fault.

The therapeusis in this case consisted of feeding small quantities of adrenal gland extract twice a day. The amount I used was one one-hundredth of a grain at each feeding, and on January 25 the patient reported to me that he was very much better, that he had had no spells of dizziness, that his appetite was excellent, that his epigastric pressure had gone, that his bowels moved each day, the stool being very well formed, that he felt stronger, that he had no more eructations of gas after meals, that he was sleeping excellently, and that he had gained 2 pounds in weight. The blood pressure had gone up to 120 systolic, 100 diastolic. This was the extent of my therapy, and I feel that the result justifies its unusual character.

Working reversely, I have used adrenal extracts, feeding them to patients who have presented the subjective and objective symptoms characteristic of all degrees of gastric hyperacidity, and have often been rewarded with success.

This paper has been written simply as a plea for a more accurate and thorough study of one's patients' characteristics; those charac-

teristics which separate them from other individuals, which are basic for those individuals. It is a plea for an increase of regard for the factors which have gone to make a patient what he is, and, finally, a plea for the recognition of the importance of correcting faults which tincture the entire organization of the patient. I feel sure that in the correction of such defects we must eliminate the vast majority of subjective symptoms, which in most cases do not depend on any definite organic change.

A CLINICAL STUDY OF 100 CASES OF DENGUE AT ST. THOMAS, V. I.

By F. F. Lane, Lieutenant (J. G.), M. C., United States Navy.

About the latter part of November, 1917, an epidemic of dengue fever suddenly made its appearance among the Americans who had been on this island three to eight months. White and black were affected alike. Up to the present time there have been over 200 cases. One hundred and forty-odd of these have been treated at the Naval Hospital. In looking over the literature of this disease it was found that there were some peculiarities manifested in this epidemic which it might be well to call attention to. One hundred records which had been carefully kept at the bedside were selected as a basis of this article. These represent very well the average run of the disease as seen during this period.

As far as statistics go, dengue has never been much in evidence on these islands. An occasional case was reported by the local health authorities each year, but it was of no moment. However, dengue is probably quite a common disease, especially among the children, but the diagnosis is rarely made because, most likely, it is one of the very numerous fevers which the natives claim to be subject to, known by many various names and usually ascribed to the evil influences of the night air and wind or to "obi," the evil genii of these parts. These patients would rarely come under the doctor's observation. Only an occasional sporadic case in an adult would be seen and diagnosed.

The epidemiology is not very definite where it concerns the source of infection. The first cases appeared in the Marine Corps. At that time there were a number of natives working at the barracks, and it is quite possible that one of them was the source of infection. The other possibility is that one of the enlisted men may have been infected elsewhere by one of the infant cases and thus brought the disease to the barracks. However, stress should be laid on one very important feature in the mode of spreading.

The sanitation of this town is about nil up to the present time in spite of much effort and thought. When the trouble started not a

house, cistern, or well had ever been screened. Water stood around in pools. The guttering of the roofs was in bad repair and water collected there. It was indeed a happy hunting ground for the far-famed and pestilent mosquito. Although the hospital had been made as mosquito proof as possible when it was put in commission, yet our neighbors raised enough mosquitoes to supply both themselves and the institution. When the first few cases had been admitted, the other patients, the members of the hospital corps, and doctors commenced to have breaking bones and fever. The spread was very rapid. It is generally understood that the mosquito is the infecting agent. About 99 per cent of all the mosquitoes, both at the barracks and the hospital, are *Stegomyia calopus*. Very occasionally the culex is seen but no anopheles as yet. It is generally understood that the culex is the spreader of dengue. In every case the patient has been exposed either at the barracks or the hospital, and only those that have been at one or the other of these two places have been attacked. The converse is also true. Another point in fastening the blame on the proper carrier is the fact that dengue is a very rapid spreader among nonimmunes. The stegomyia bites by day as well as by night, so that no amount of mosquito bars could protect those doing duty unless they were confined to bed. If the mosquito had been a night biter only, the rapid spread might have been checked. All of the foregoing seems to put the blame wholly on the *Stegomyia calopus*, a point which has never been brought out very strongly. The possibility of the stegomyia as a spreader of the disease is mentioned by some but never considered seriously.

The incidence of new cases depended very markedly on the rainfall, as does everything else influencing the health of this community. Within 36 to 48 hours after a rain the mosquitoes would increase very rapidly and the new cases develop in almost direct proportion. During a dry spell there might be no new cases for days at a time and the mosquitoes would be conspicuously lacking in proportion.

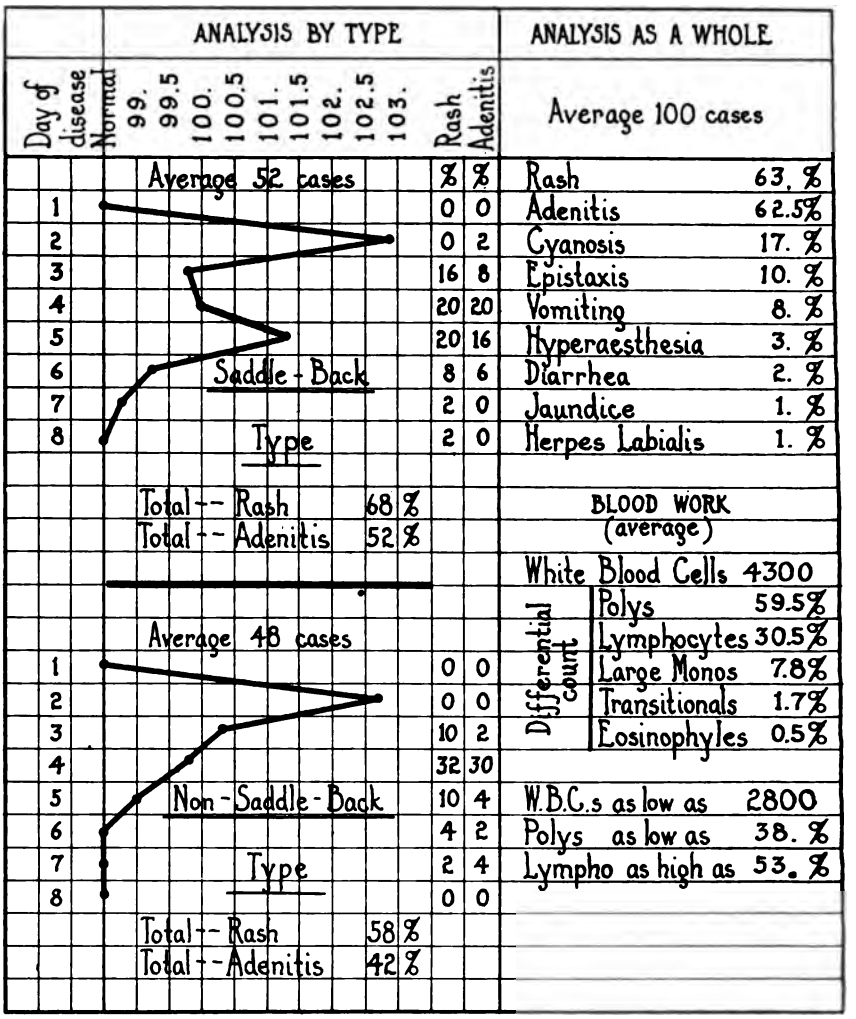
The incubation period was rather difficult to ascertain, but in three cases it was very definitely placed at four to six days. All three contracted dengue within this period after the arrival from the States.

The symptomatology, in general, was about the same as described elsewhere. The onset was sudden, beginning with the vague pains in the back and legs; headache; malaise; chilliness or an actual mild chill; perhaps constipation or maybe diarrhea; loss of appetite; feverishness and occasionally a flushing of the skin of the face and the neck. These were about the usual findings the first day.

The second day found the primary flush of the face gone and the patient was quite sick. The temperature was between 102 and 105 degrees; the aches and pains in the back and extremities, the head-

CLINICAL CHART

ONE HUNDRED CASES OF DENGUE FEVER



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ache and the pain in the eyes were much worse than the day before. However, these symptoms were not, and never became at any time during the disease, as severe as those usually described, especially the bone pains. The interesting feature at this time was the intense pain in the eyes, especially on voluntary motion, accompanied by a congestion of the conjuctivae and the watery condition so often seen in measles. The pain on motion was elicited by having the patient keep the head fixed and the eye follow the finger of the examiner as far upward and to each side as possible. These eye symptoms, the sudden rise of the temperature, and the anorexia were so characteristic and constant that a diagnosis could be made definitely without reference to the previous day's history or the bone symptoms, which I remarked before were almost trivial. Except for these eye pains the patient might have had a severe attack of influenza without any bronchitis. The pulse was quite slow in comparison with the temperature, seldom rising above 90 per minute, usually 75 to 85, with the temperature at 104 F. or 105 F. Those cases that had a blood examination made at this time showed a leucopenia of from 5,000 to 6,000, a slight decrease in the polymorphoneuclear leucocytes and a slight increase in the lymphocytes. Instead of the insomnia usually described, all the patients seemed to sleep especially well throughout the entire course of the disease. In fact, the condition was quite the reverse of insomnia, a sort of stupor for the first four days at least. The urine did not show any constant alteration from the normal.

On the third day the temperature fell as suddenly as it rose, seldom, if ever, to normal, but to between 99 F. and 101 F. The mental and physical depression, while still present, was much less, the pains and aches better, and although still weak and tired the men almost invariably stated that they were well and wanted to get out of bed. At this time the disease took on one of the two forms usually described: The "saddleback" and the "nonsaddleback" type. A careful study of the majority of the temperature charts would give a fairly accurate prognostication. It seemed that those doomed for the "saddleback" or second rise of fever would drop about a degree lower than those going on to an uneventful recovery, the "nonsaddleback" (see illustration of the average chart). Some few (13 per cent) would show the beginning of the secondary rash.

The fourth day's chart found those of the "saddleback" type with a rise in temperature of a fraction of a degree and those of the "nonsaddleback" type with a fall of about the same amount. In either case there was the bright red or scarlet rash like that of measles. In the very typical cases this began on the palms of the hands, over the back of the thumb, and over the dorsal surface of the great toe, spread-

ing rapidly over the arms and legs, abdomen, chest, and face. It was most marked on the forearms and lower legs, abdomen, and face. The itching was not as marked as it became some days later. This eruption was present on the fourth day of both types in 26 per cent of the cases. During the third or fourth days, or the period of so-called crisis, 10 per cent of the cases had epistaxis and 8 per cent vomiting. The epistaxis was quite severe when it occurred, lasting from 24 to 72 hours and leaving the patient somewhat exsanguinated in spite of ice, packing, absolute rest, and the other usual forms of treating nosebleed. Diarrhea was present in 2 per cent, herpes labialis in 1 per cent. A blood count late the third day or early the fourth day showed a leucopenia of from 2,000 to 3,500, with a very considerable decrease in the polymorphoneuclear leucocytes as low as 38 per cent and an increase in the lymphocytes as high as 53 per cent.

This fourth day was most important from our standpoint, as it marked the beginning of a complication of which very little is said in the literature on the subject; namely, the involvement of the lymphatic glands, amounting to a general lymphadenitis as a rule. In 5 per cent of patients this started on the third day, but in 25 per cent on the fourth day.

The condition was brought very forceably to our attention in the third or fourth case. The man began to complain very severely of pain, tenderness, and swelling in the glands of both groins. Examination revealed inflamed, swollen, tender, and painful glands in both inguinal regions. This was so very marked that although the man was known to be free of venereal disease (a hospital corpsman who had been with us for eight months) this possibility was carefully looked into and examinations made for the four or five succeeding days. Nothing of a venereal nature was found. The second day after the inguinal glands became involved, the epitrochlear and anterior and posterior cervical glands enlarged but were not painful. This case started the careful notations of this series. All cases that had any history of venereal disease, either active or of old standing, were thrown out as indefinite. In all, this venereal type amounted to about 25 per cent of the total number studied. The glands in all this number were found to be involved, but whether due to dengue or venereal disease could not be determined. In the other 75, 62.7 per cent had lymph gland involvement to a greater or less degree. All were swollen, some were painful or tender, and in the very few cases that we were able to follow up they remained swollen and tender from four to six weeks. (See chart for incidence of adenitis and percentage developing each day of the disease.)

The fifth day invariably told the tale as to whether the case would be of the "saddleback" type or not. Of the cases studied, 52 had the secondary rise of temperature and the other 48 did not. On this

day 15 per cent, including both types, showed the first signs of rash and 10 per cent gave the first signs of the adenitis. Those that had the rise went up one to two degrees and those that did not dropped to normal or a fraction above. The latter type immediately began to pick up strength, both mental and physical, and were usually allowed out of bed.

On the sixth day, the "nonsaddle-back" had no fever and remained so. The rash appeared for the first time in 6 per cent and the adenitis in 4 per cent of the total number. The "saddle-back" type had a fall in temperature to 99 F. or a fraction above. On this day one case developed jaundice. There were two other cases that had an icteroid appearance, but they had a history of having had jaundice at some time previously, due most likely to syphilis, and, therefore, they were not counted in the statistics.

Most of the patients were out of bed on the seventh day. Those that had had the remission of fever were now either normal as to temperature or they had a fraction of a degree and were so restless that a longer stay in bed seemed to be useless. The other type had not had any fever for two days. Some 2 per cent of all cases had the beginning rash and 2 per cent the adenitis. At this time two very interesting skin phenomena started. After being out of bed for a day or less 17 per cent, according to the records that were made at the time (although I am sure that there were almost twice that number in whom the symptom was overlooked in the beginning of the study and charting), commenced to have a very peculiar vasomotor condition. The hands, arms, feet, and legs were quite cyanotic, cold, and very damp. In a few instances this spread to the abdomen and the chest. Pressure on the skin would leave a white mark which very quickly became blue on release of pressure. Rest in bed, elevation of the part, and heat did not seem to have any effect in the relief of this condition. There were no subjective symptoms except that the hands and feet felt cool without real discomfort. The cyanosis gradually faded away in about three days and did not reappear. It did not seem to have any definite relation to either type of the disease. Secondly, there was a very marked hyperæsthesia over the arms, chest, shoulders, and the upper back in three cases. The weight of the clothing was quite painful and if the part was touched the pain was intense. There was no local abnormality of the skin accompanying this. These cases did not have the cyanosis noted above.

All cases were discharged by the end of the eighth day at the latest. None had any fever at this time and all felt fairly strong and ambitious. About 1 per cent had the rash just starting, but no one had the lymph gland involvement beginning this late. About

this time the desquamation of the skin commenced. As far as could be learned practically every one that had had the rash "peeled." This process started with a very fine furfuraceous scale which gradually became coarser as time went on. In fact, where the desquamation involved the horny portions of the skin, such as the soles of the feet and the palms of the hands, the scales consisted of large pieces. In two or three instances there was almost a complete cast of the great toe, some two or three weeks after the fever had subsided. In several instances the desquamation lasted for six or seven weeks, gradually becoming finer as time went on, until it faded out completely. About this time or a little earlier the appetite began to return, but there was a peculiar metallic taste to the food which almost every patient complained of.

Nothing much has ever been said about the after effects of "Dandy fever." As far as could be learned, and in my own case particularly, complete recovery of strength was not attained until two or three weeks after the fever had subsided. It was about the same condition as is experienced during the recovery from a very severe attack of tonsillitis or "quinsy." While under ordinary circumstances the convalescent felt fairly well and strong for the usual tasks, endurance was very low and any amount of exercise in excess was very enervating. Reserve strength was entirely lacking.

DIAGNOSIS.

The absence of any throat, chest, or abdominal symptoms or findings; the history of the sudden onset, in some cases beginning during the night with a chill; the sudden rise of temperature with a comparatively slow pulse; the pains in the back, legs, and eyes, especially the pain on forced motion of the eyeballs; the watery, congested conjunctivæ; chilliness and malaise; anorexia; the low leucocyte count; the fall in the percentage of polys and the increase in the lymphocytes; and the absence of any abnormal findings in the urine would be sufficient to give the diagnosis on the second day, the time at which the great majority of the cases came under observation.

IMMUNITY.

In most cases there seems to be an immunity after one attack. The epidemic began suddenly among the newly arrived population. The American negroes, on duty in the Tropics for the first time, had "breakbone" fever in even a higher percentage than the whites. The native negroes had no increase in the disease. There were six or seven new cases reported by the civilian physicians, but these were among children of white parentage ranging in age from 3 to 6 years. These circumstances only added credence to the assumption

that the natives were immune, due most likely to the fact that they had all had the disease as infants or in early childhood. There were, however, at least 10 cases among the two hundred and odd in the town as a whole that had a recurrence within three to six weeks after a typical first attack. The second was always milder, but similar to the first. Five or six others had had dengue several years before, but had another attack at this time. There were two others who had been through several epidemics without ever having contracted it and considered themselves to be immune. They both had a severe attack.

It would seem, therefore, that one attack usually gives immunity, but about 5 to 8 per cent have a recurrence within a few weeks or within several years.

Treatment.—The treatment of the condition as carried out was entirely symptomatic. The patient was given a bath and a purge and put to bed. The purge was usually a saline (magnesium sulphate) and was sometimes repeated in two days. In those whose bowels were kept well opened there seemed to be a more rapid and complete relief of the symptoms. If the headache was very severe an ice cap was in order. As a rule, 5-grain doses of aspirin t. i. d. or q. d. relieved the aches and pains and seemed to relieve the sensation of fever by inducing a mild sweat, although in many cases the perspiration was spontaneous and profuse. The diet was usually soft, unless, as rarely occurred, the patient retained his appetite. Water was given freely. As a rule, the patient was allowed to do about as he pleased after the temperature had dropped to normal or thereabouts. He had whatever he wished to eat; he was allowed to be in or out of bed according to his inclination, and it was found that none of them stayed up for any length of time, for, although they felt quite strong before getting up, they were very glad to get back into bed within 15 or 20 minutes, at least during the first day or two. This leniency seemed to act for the best in two ways—it satisfied the patient's mental and physical unrest at being laid up with a trifling disease, as he considered it, and it also helped to get his mind off the aches and pains that still existed to some extent. There were no harmful effects observed from this method of treatment, and in fact we thought that it even improved the speed of recovery by hurrying the recuperative power for increased physical exercise. All cases were kept under mosquito bars during the infective stage, supposed to be five days.

Summary.—There are some 10 or a dozen peculiarities of this epidemic. Points that others have only touched lightly upon, or not at all, that I wish to call your attention to are:

First. The immediate source of the infection was unknown and could only be guessed. The important feature, however, was the

agent carrying the infection. The blame can be placed entirely and without hesitation on the *Stegomyia calopus*, practically the only mosquito seen and inhabitating the localities where the disease was most prevalent, and the only place where the mosquito bite seemed to do any damage. I believe that the stegomyia family have been suspected before, but nothing definite has been written as far as I can find in references to the subject.

Second. The mild character of the bone pains was characteristic.

Third. The interesting and previously not definitely reported involvement of the lymph glands. In many cases this was quite severe and was treated with ice. No breaking down nor suppuration subsequently has been noted. In all, 62.7 per cent of the 75 free from venereal infection developed this. A rather high percentage. It was not one set of glands but all the large superficial glands throughout the body.

Fourth. The epistaxis, although it only occurred in 10 per cent of the cases, was very severe and difficult to control.

Fifth. The pain on forced motion of the eyeballs was the principal cause of the symptoms described by the patient as "headache" or "pain in the eyes." Probably this was due to the muscular attachments rather than to the muscles themselves, for the pain was only elicited on extreme motion.

Sixth. The very peculiar and sometimes startling symptom of hyperaesthesia, of a most intense variety, was noted when the shoulder was unconsciously touched by the examiner.

Seventh. The vasomotor phenomena occurred from the sixth to the eighth day, causing a cyanosis and coldness of the arms, hands, lower legs, and feet in about 17 per cent of cases.

Eighth. The disappearance of the eruption was followed in about 24 hours by a quite severe and long-continued desquamation, accompanied by intense itching at times, a sensation as of swelling of the hands and feet, and a continual and profuse sweating of these parts.

Ninth. The blood work did not show on the average the very low leucocyte count and the discrepancy in the differential count usually acredited to dengue, yet these findings were sufficiently marked in a number of cases to accord perfectly with other descriptions. It would seem from a general view that these blood findings depended largely on the severity of the attack.

Tenth. A very disturbing feature in the convalescence, from the patient's standpoint, was the inability to relish food due to the bad metallic taste that everything had, although the appetite was quite keen.

Eleventh. All the ordinary work could be performed without any difficulty, but the least extra strain, such as fast walking or going up hill, brought on an intense weakness and fatigue which had not

been present before the fever and which it took some days and, in many cases, weeks to overcome.

Twelfth. The last feature to which attention is called is the question of immunity. In most cases this seems to hold after one attack, but about 5 to 8 per cent had a recurrence three weeks to several years after the original attack.

The epidemic gradually faded out. About the 1st of March, 1918, with the decrease in rainfall it had almost disappeared. Only an occasional individual who had just arrived would become infected. During the dry season when mosquitoes were very few, dengue was practically absent. Now the rainy season has started and in the last 14 days seven cases have developed, two being recurrences from the last epidemic. The control of the mosquitoes and their breeding places has improved to a slight degree and it is hoped that there will be fewer of the pests, but the inability to obtain screening for the town, the lack of a properly trained corps of sanitary inspectors, and the difficulty in educating the people (natives) does not give much hope of freedom from dengue in the near future.

EPIDIDYMOTOMY IN MILITARY SURGERY.

By L. HERMAN, Lieutenant (J. G.), M. C., United States Navy.

Surgeons in civil practice have no unanimity of opinion regarding the treatment of acute gonorrheal epididymitis. Most surgeons advocate operation in a small percentage of well-selected cases, a few employ it regularly, while the majority of authorities ar opposed to all operative forms of treatment and continue to rely entirely upon the topical application of ointments or of various other medicaments.

Differences of opinion likewise exist among the advocates of routine operation as to the best technical procedure to employ. Some believe with Hagner that the most satisfactory results are to be obtained by free exposure with splitting of the epididymis and drainage; others maintain that a much simpler technique is in all respects preferable in the vast majority of instances. In civil practice, it has been our rule to reserve epididymotomy for the hyperacute cases and largely with the idea of relieving the intense pain that characterizes them. In practice among out-patients in the clinics of large cities these cases are usually ambulant. It has been our experience that while the convalescence time is materially shortened in this class of patients by operation as far as the subsidence of the inflammation is concerned, the total duration of the infection is not influenced by operation. This we now believe may be explained by the failure to confine these patients to bed for a reasonable length of time after operation. In

view of the failure to materially reduce the duration of the disease and because of the probably greater percentage loss of function of the epididymis in operative cases we had adopted epididymotomy in only a small group of cases in civil practice.

The conditions that obtain in naval surgery are in certain respects different than those in civil practice. In time of war it is doubly important to return the patient to duty in the shortest time possible, and to return him in such condition that he will be no longer a menace to the health of his shipmates. It is equally important to minimize the probabilities of the recurrence of the disease. The problems are most satisfactorily solved by the operation of epididymotomy. We feel that in cases of unilateral epididymitis the small differences in the percentage retention of function gained by the palliative form of treatment is far outweighed by the advantages of rapid relief from pain, rapid and more complete subsidence of the inflammatory reaction, by the much shortened hospital residence of the patient through operation, and finally by minimizing the probabilities of recurrent epididymitis so commonly seen in cases treated palliatively.

Technique of operation.—The operation of epididymotomy employed in Navy Base Hospital No. 5 is a simple procedure. The technique about to be described is applicable to that great majority of cases of acute Neisserian epididymitis in which the major part of the inflammatory process is confined to the globus minor of the epididymis. Infiltration anesthesia, using a solution of cocain (½ per cent) is employed, and the operation can be performed painlessly if care is taken in the localization of the injection. A line of infiltration 1½ inches in length is made in the skin of the lower part of the scrotum, just to the side of and parallel with the raphé and over the inflamed globus minor. The scrotum is gently grasped at its base by an assistant who rotates it so that the field of operation is brought conveniently into position. The assistant makes gentle pressure in order to render the skin taut. Unnecessary pressure at this time will cause considerable pain to the patient and accomplish nothing more than will the gentlest handling of the inflamed parts.

An incision about 1½ inches in length is now made through the anesthetized skin and subjacent tissues down to but not through the fibrous sheath covering the epididymis. Care must be exercised in order to define the line of reflexion of the parietal layer of the tunica vaginalis from the point of its reflexion at the junction of the epididymis and body of testis. This differentiation is made by noting the differences in consistency of the tunica above and the epididymis below. The sac of the tunica will be found to be more or less distended with inflammatory fluid constituting a hydrocele which is fluctuant and painless to gentle pressure. The epididymis, on

the contrary, is indurated and exquisitely tender to pressure. Care should be taken not to open the tunica, otherwise the patient's convalescence will in all probably be prolonged through the reformation of a hydrocele which has little tendency to be absorbed and which will necessitate either puncture or radical operation. In cases in which large collections of inflammatory fluid are demonstrable in the sac of the tunica at the time of operation we are in the habit of introducing a small aspirating needle at a point as far removed as possible from the epididymis, but through the operative incision, and removing the fluid. Small inflammatory hydroceles may be disregarded.

The next step in the operation is to thoroughly anesthetize the fibrous sheath of the epididymis in the line of the original skin incision. The sheath will usually be found to be much thickened, especially in cases of long standing. The sheath is then incised, the opening being approximately one-half inch in length, whereupon the epididymis proper, which is usually under considerable tension, will bulge through the wound. The incisional edges in the sheath are then grasped with forceps and if it is desired the opening may be enlaged by exerting traction on the forceps when the sheath will tear in the line of the incision. It is highly important to recognize each anatomical structure in the various steps of the operation. This is easily accomplished if the wound is kept free from blood.

It is now necessary to anesthetize the tubule of the epididymis and the fibrous tissues that connect its various convolutions. This is the least satisfactory step in the operation for the reason that increased tension incident to the injection of the anesthetizing fluid causes pain; this is transitory, however. With a sharp knife, the cutting edge of which is directed away from the testis, a stab wound is made in the epididymis. Not infrequently abscess cavities are opened in long-standing cases and necrosis of the epididymis is found. In this latter group we gently curette the walls of the necrotic area. In the very earliest cases of acute gonorrheal epididymitis we sometimes substitute multiple needle punctures for incision of the epididymis. The relief of tension incident to depletion of the vessels promotes absorption of the inflammatory exudate. Experience is necessary, however, in the selection of cases suitable for this procedure, since in improperly selected cases it not only fails to relieve the condition but invites additional inflammatory reaction. In the small group of cases in which it is indicated it undoubtedly helps to restore the patency of the seminal duct and thus avoid sterility. Incision of the epididymis must, it would seem, render the testicle functionless as far as its spermatogenic function is concerned, although we have no definite knowledge that this does actually occure in every instance. A small

quantity of Dichloramin-T is injected through the opening in the epididymis and a piece of rubber tissue rolled into the form of a scroll is then anchored to the depth of the epididymal incision. This step of the operation is much facilitated by using a small sharply curved needle and plain 00 catgut. In some instances bleeding occurs from the incised epididymis and this can best be controlled by the introduction of deep sutures; no attempt should be made to clamp and tie such bleeding vessels. Indeed, it is unnecessary in any stage of the operation to employ ligatures, and a rubber tissue drain is brought out of the lower end of the incision. The latter is closed by means of a few sutures of plain catgut so inserted as to include all areas of the scrotal wall. The application of a dry dressing completes the operation. The scrotum is enveloped in a gauze bandage applied in exactly the same manner as is a scultetus bandage of the head. A T-bandage may be used to advantage.

Post operative treatment.—The patient is confined to bed with elevation of the scrotum until the rubber tissue drain comes away spontaneously. This occurs about the fifth day in the average case. The drainage is seldom profuse and rarely frankly purulent. The wound heals by primary union except in the rarest instances. Bladder irrigations with weak solutions of potassium permanganate are begun after the drain has been removed but only in patients entirely free from acute urethral symptoms. Internal medication may or may not be given at the discretion of the individual surgeon.

Results.—The operation of epididymotomy immediately relieves the pain which is often severe, so that convalescence is practically symptomless. In one case, terminal hematuria followed operation and persisted for 10 days. In the second case a small hydrocele necessitating aspiration, appeared after operation; this patient however was clinically well and ready for duty 19 days after the epididymotomy. In a series of 40 consecutive cases, the average hospital residence of the patients operated upon was 25.3 days; in the mild cases which were not operated upon, it has been 36 days on the average. The operated cases are not returned to duty until the wounds are completely healed, until the urine has entirely cleared and has remained clear for 5 days without treatment, and until the patients have demonstrated their ability to do a full day's duty with the hospital working parties. We have seen only one instance of recurrence of epididymitis following operation in either civil or military experience.

The results of operative treatment are particularly striking in recurrent cases as is illustrated by the following case history:

M. W. H., seaman first class, U. S. S. ———, admitted to Navy Base Hospital No. 5, November 7, 1918, for the treatment of bilateral gonorrheal epididymitis of one month's duration. Under palliative

treatment the inflammation subsided but soon recurred on the left side. Repeated attacks of epididymitis on the left side associated with persistent urethritis confined this patient to the hospital for a long period of time so that the question of medical survey for incurable gonorrhea was discussed. On February 10, the left epididymis was drained; 21 days later he was returned to duty. He now reports to us two months after the operation that he has had no further trouble.

An especially satisfactory result in the operative treatment of acute epididymitis is illustrated by the following case:

P. C., fireman first class, U. S. S. ———, was admitted to the hospital on February 8, 1918, with acute left sided epididymitis. Operation was performed on the day after admission and nine days later he was returned to duty clinically cured.

We feel justified in advocating epididymotomy in all acute cases of gonorreal epididymitis with the possible exception of those cases with a minimum of inflammatory reaction; in all recurrent cases; in all chronic cases where marked thickening with the epididymis associated with tenderness is indicative of the presence of pus. In this latter group of patients, the inflammation persists for a long time unless drainage is provided and later gives rise to neuralgia of the testis often with profound sexual neurasthenia.

EPIDEMIOLOGY OF CEREBRO-SPINAL FEVER AT UNITED STATES NAVAL TRAINING STATION, GREAT LAKES, ILL.

By J. T. Short, Lieutenant, M. C., United States Navy.

For many years epidemic cerebro-spinal fever has been considered a communicable disease, which, in military life, appears upon the mobilization of young recruits, and usually in connection with predisposing factors, such as bad weather, crowding, or fatigue. More recently it has been shown that the causative agent is the meningococcus, spread by direct contagion from the naso-pharynx of a patient, a convalescent, or a presumably healthy individual. The corollary which at once suggests itself is that if the "carriers" of the meningococcus can be segregated the danger of an epidemic will be largely overcome.

In order to make clear many of the factors that were operative in the recent epidemic of cerebro-spinal fever at this station it is necessary to describe briefly the general organization of the station and the several phases of training through which the average recruit ordinarily passes, as well as to outline the work on meningitis preceding the epidemic.

On his arrival the recruit is first placed in an incoming detention camp, where he remains 21 days. During this period he is expected

to make the transition from civil to military life and to adapt himself more or less completely to his new environment, to abandon his individual ideas and customs of dress, food, exercise, and recreation and conform to the manner of living that is prescribed for the majority of his fellows. He must learn to sleep in a hammock, and usually with more than his customary amount of fresh air. He must overcome his homesickness, make new acquaintances, and learn the rudiments of military life and discipline. Meanwhile physical examinations, necessary dental work, vaccination, and typhoid prophylaxis are completed. Following his detention period the recruit is transferred to one of the other camps, where general or special training is continued for a variable period, averaging three to six months. He may then be transferred to the outgoing detention camp, where he remains under observation and is given a number of medical examinations and inspections before leaving the station. In each camp and regiment a certain number of men are held for indeterminate periods to assist in administration, instruction, and the maintenance of public works.

The work of discovering and isolating meningococcus carriers, in conformity to general practice, has been greatly facilitated here by taking advantage of the organization described above. It has been the custom to make naso-pharyngeal cultures of all new men on the station as early as possible in their period of incoming detention, and to isolate those found to be harboring the meningococcus. The men in outgoing detention have been similarly examined, and the carriers detained and isolated.

Whenever a case of cerebro-spinal fever was diagnosed, the following procedure was carried out as a matter of routine. The company of men and the barracks from which the patient came were placed in quarantine and everyone cultured. Additional cultures were made on all possible contacts, such as hospital corpsmen and patients in the regimental sick bay where the man with the disease may have been treated for a short time before transfer to the hospital. Upon completion of a preliminary examination of the cultures, usually twenty-four hours, the men who had yielded organisms resembling the meningococcus in cultural characteristics, morphology and staining reaction were declared to be carrier suspects and were removed and placed in the isolation units or "cubicles," at the disposal of the regimental surgeon. The quarantine was then lifted and the remaining men discharged to duty. Suspects discovered in the detention camps were similarly placed in cubicles. According to the final laboratory report, based on agglutination reactions, the ciated case, the potential danger would be the same from all strains

ferred to the meningococcus carrier camp if positive. The types[1] of meningococci were not determined in the routine work, and all men whose organisms gave positive agglutination reactions with Flexner's polyvalent serum were isolated, under the assumption that although all might not give the type corresponding with the associated case, the potential danger would be the same from all strains thus shown to have been pathogenic.

The isolated carriers, from all sources, have been cultured at intervals of five days, and held until four successive negative cultures were obtained. For a time, all hospital patients returned to the station were cultured in a special camp and required to give two successive negative cultures without treatment before discharge to duty, the discharged carriers also going through this group. After three or four months, however, this was discontinued and the hospital (which is under separate management) secured the necessary negative cultures before discharge of patients, while the carriers were returned to duty directly from the carrier camp.

In taking naso-pharyngeal cultures, the open-swab method has been used exclusively. The men to be cultured come forward in single file, facing the light, and repeat assigned numbers (recorded serially) to the man who swabs. He in turn repeats each number as the swab is passed to me across a table, and a blood-agar Petri dish, already numbered, is immediately touched with the swab and streaked with a sterile wire. By elimination of all unnecessary movements and the assistance of one man on the left to number and dispose of plates and another on the right to flame wires (of which two are used to allow time for cooling), entirely satisfactory cultures may readily be taken at the rate of about 300 men per hour. The plates are kept warm with hot-water bottles at all times except during actual inoculation, are transported to the laboratory by closed motor bus, and at once placed in an incubator.

The methods in use by the laboratory force are briefly as follows: The inoculated peptone-blood-agar plates are incubated at 37 C. from 12 to 18 hours, or until a satisfactory growth has taken place. Colonies with meningococcic characteristics are selected and if the organisms composing them show the morphology and staining reaction of meningococci, subcultures are made on blood-agar slants and a preliminary positive report is given, the remaining plates being regarded as negative. Saline suspensions are made from the subcultures the following day and tubes are set up for microscopic agglutination with Flexner's polyvalent diagnostic serum in dilutions

[1] Gordon: Bacteriological Measures Adopted for Dealing With the Military Outbreak in February, 1915, and Improvement Expected as the Result of Research, Special Report of the Indicated Research Committee on Bacteriological Studies in the Pathology, Prevention, and Control of Cerebro-spinal Fever Among the Forces During 1915 and 1916. London, T. Fisher Unwin, 1917.

of 1 to 50, 1 to 100, and 1 to 200, with controls of horse serum 1 to 50, and physiological saline suspensions of the organisms. These are incubated at 55 C. for 18 hours and the readings then made. Agglutination by the polyvalent antimeningococcic serum in any of the above dilutions, with satisfactory control, has been regarded as indicative of the meningococcus, and the final report is made on this basis. Type agglutinations with Flexner's sera (for "normal," "para," "irregular normal," and "irregular parameningococci") have been done in a few recultures, and will be reported upon completion of the series.

The practice of taking pharyngeal cultures for meningococci was first begun at this station under the direction of Medical Inspector C. M. DeValin, United States Navy, in May, 1917. This was near the close of a cerebro-spinal fever epidemic of 99 cases, distributed as follows: January (1917), 5 cases; February, 9; March, 13; April, 25; May, 35; June, 11; July, 2. The mortality was 31 per cent. No further cases developed until October, when three cases occurred. These were followed by 4 in November and 19 in December. Reference to these latter cases will be made below. It is noteworthy that during the above period the population of the station increased many times, reaching 15,000 in November and 25,000 in December.

The total number of cultures made at this station in 1917 are grouped below under several headings, with the percentages of carriers found in each instance.

	Number.	Per cent.
Cultures in incoming detention	19,639	.....
Positive cultures	139	0.7
Cultures in outgoing detention	14,008	.....
Positive cultures	234	1.6
Cultures of cerebro-spinal fever contacts	3,660	.....
Positive cultures	44	1.2
Cultures of hospital convalescents	1,463	.....
Positive cultures	39	2.6
Cultures of meningococcus carriers	2,716	.....
Positive cultures	623	22.9
Total cultures made, exclusive of carriers	38,770	.....
Positive cultures, exclusive of carriers	456	1.2
Cultures made, unclassified	669	.....
Total cultures for station laboratory during 1917	42,155	.....
Additional cultures taken on the station for examination by other laboratories	7,294	.....

The epidemic.—Although 19 cases of cerebro-spinal fever occurred at this station in December, 1917, the epidemic proper began in January, 1918, with 84 cases. The incidence decreased during the last week, and February concluded the epidemic with 10, in the first three weeks. The mortality has been about 22 per cent, with a

marked decrease since the middle of January. The data obtained in the individual cases, more complete since January, is shown in tables referred to below. The diagnoses of January cases No. 36 and No. 81 have been changed. and reference to them as meningitis cases has been everywhere omitted except in the January table.

A glance at the table of incidence by regiments and barracks, or at a spot map of the station, shows that the great majority of the men developed the disease in Camps Dewey and Perry, in the newest part of the station separated from the other camps by railroad tracks and a highway. The seven regiments in these camps are made up mainly of recruits in their first period of training. It is seen further that of the January incidence in these camps 30 per cent was in the second regiment, where there had been a previous epidemic of bronchitis, influenza, and measles, and which was composed mainly of imperfectly seasoned recruits living under excessive stress, as will be shown later. In contrast the incoming detention camps escaped with one isolated case on January 13 (No. 35), and a second five weeks later February (No. 9). While this camp comprises the newest recruits it will be remembered that they are not yet doing routine work, their limitations are more generally recognized, and their mode of life is very carefully superintended. In addition it has been shown that in this camp there is an allowance of approximately 50 square feet of floor space per man, and indoors the men are segregated into groups of but 24, while in the camps mentioned above 60 to 75 men were living in one room during this period instead of a proportional 40, thus reducing the floor space per man in some instances to almost half of that mentioned above. In the rest of the station, made up of men in administrative or instruction details and those advanced in training, only a few isolated or sporadic cases occurred.

In looking for one or two barracks as foci in the dissemination (such as would be expected were a particularly menacing carrier passed unnoticed), the table of barracks incidence is disappointing because of the inconstant results. Four cases occurred in barracks 521–S, and three in each of the following: 230–N, 231–S, 430–W, 431–W, 721–S, but most of the barracks had only one or two cases. While in a number of instances two men became sick on the same day or within two or three days of each other, the interval in as many instances is found to be 22 days or a month—as in barracks 521–S. Furthermore, in the barracks with several patients the percentage of carriers was not excessive in comparison to that found in other barracks during that particular period.

Almost exactly coincident with the epidemic in the latter part of December and January there was a long-continued period of cold weather. The mean daily temperature was below the freezing point from December 25, 1917, to February 5, 1918, with the minimum

mean temperature reaching —4 F. on January 12, and February 4. As shown by a weather chart there was a tendency, further, for fluctuations in the temperature to be accompanied by a variation in the incidence of cases, the greatest number of which occurred during the coldest week, January 12 to 18.

Notes from various Army camps during the winter show that the cold weather also influenced the meningitis incidence in them. Camp Wheeler mentions on January 25,[1] that the "cold rains" of the week added to their already high sick report, including mumps, pneumonia, and meningitis. A tabulation of cases of meningitis reported in the Army camps each week[2] shows that the disease was generally most prevalent during December and January with a decline during February, and by March 1 had almost disappeared. Exceptions are to be noted in Camps Bowie, Shelby and Funston, in which the epidemics were a little earlier and Camp Hancock where it was later.

Camp and location.	Number of cases of meningitis at Army camps for weeks ending—													
	Nov. 30, 1917.	Dec. 7, 1917.	Dec. 14, 1917.	Dec. 21, 1917.	Dec. 28, 1917.	Jan. 4, 1918.	Jan. 11, 1918.	Jan. 18, 1918.	Jan. 26, 1918.	Feb. 1, 1918.	Feb. 8, 1918.	Feb. 15, 1918.	Feb. 22, 1918.	Mar. 1, 1918.
McClellan, 29th, Alabama	2	0	1	0	1	4	3	0	5	2	0	0	1	0
Hancock, 28th, Georgia	0	1	1	1	0	1	3	0	2	3	3	4	2	6
Wheeler, 31st, Georgia	2	3	1	1	1	2	0	1	4	0	1	1	0	0
Doniphan, 35th, Oklahoma	1	2	6	10	12	0	10	0	4	3	2	0	1	0
Bowie, 36th, Texas	8	15	9	2	3	2	0	0	0	2	3	1	3	2
Shelby, 38th, Mississippi	6	6	0	0	1	0	0	0	0	1	4	1	2	0
Beauregard, 39th, Louisiana	3	6	3	4	7	26	16	13	9	8	6	5	0	2
Meade, 79th, Maryland	0	0	4	2	3	1	3	4	5	2	4	1	2	0
Jackson, 81st, South Carolina	7	16	30	37	30	15	13	14	23	19	6	4	9	0
Gordon, 82d, Georgia	0	0	1	2	5	11	4	3	6	1	1	4	1	0
Sherman, 83d, Ohio	1	0	5	2	0	2	3	0	1	1	3	0	0	0
Taylor, 84th, Kentucky	0	0	5	3	0	2	2	3	2	2	0	2	0	1
Custer, 85th, Michigan	0	0	2	1	0	0	0	2	7	1	0	0	0	0
Pike, 87th, Arkansas	0	4	2	8	3	4	1	1	2	0	1	0	0	2
Funston, 89th, Fort Riley, Kans.	12	9	6	3	5	4	1	2	5	3	3	2	2	3
Travis, 90th, Texas	0	0	0	4	9	1	1	4	5	4	4	2	2	0
Lewis, 91st, Washington	5	5	1	5	1	1	4	2	1	2	2	0	2	2

In studying the individuals with the disease the well-known incidence among new recruits is at once apparent. In the 94 cases during January and February, 71 men (75 per cent) had been on the station less than seven weeks, or, in other words, had finished their 21-day detention period less than a month previously. The curve showing this fact is equally striking in the absence of cases before the latter part of the third week, which may possibly be accounted

[1] Jour. Am. Med. Assn., Feb. 2, 1918, p. 322.
[2] Jour. Am. Med. Assn., Dec. 15, 1917, to Mar. 16, 1918.

for on the basis of the more careful housing during that period as pointed out above.[1]

By tabulating chronologically the dates of arrival at the station of the men who developed the disease during January, it was further found that 57, or 67 per cent, of them had come to the station between December 2 and December 15. This is also true of the first case occurring in February. These dates are significant in view of the situation on the station at that time. Owing to the ruling which prevented men of conscription age from volunteering their services after December 15, 1917, recruiting offices were crowded and many men enlisted in the Navy. In fact, from approximately 15,000 men on December 1, the population of the station by December 15 had risen to 25,000, where it remained. At this time and subsequently a series of circumstances operated as strong predisposing or determining factors in the incidence of disease among these young recruits, especially of cerebro-spinal fever. Owing to the limited capacity of the incoming detention camps it was necessary to hurriedly outfit a large number of the men and transfer them to an instruction camp *within a week*, often *within two or three days*. In spite of the skillful manner in which the situation was handled it was inevitable that many men should lose sleep and rest, while the hurried atmosphere in which they were rushed from one place to another to secure various examinations and new equipment made it exceedingly difficult for them to adapt themselves to their new environment.

In the routine tests of these men by the Psychiatric Unit it was found, further, that they were somewhat below the high average intelligence shown by the men enlisted before and after this period. From this it might be inferred that they would adapt themselves to new conditions less readily than the others. This would show itself in such things as failure to properly protect themselves from exposure by the use of overshoes and overcoats, or by the change of wet clothing.

In the camps to which these men went, mainly the first four regiments in camps Dewey and Perry, an effort was made to continue their detention, but it was somewhat less rigid than in the detention camps. There was also considerable crowding, as pointed out above, which brought them into relation with a larger number of people and in much closer contact. The question of proper ventilation, however, may be ruled out, as throughout the station the regimental surgeons make daily recommendations in this respect and each night make inspections to determine that they are in force with satisfactory results.

[1] Mink, O. J.: Points in the Epidemiology of Meningitis, abstr., Jour. Am. Med. Assn., Feb. 23, 1918, p. 563.

Before these new men could much more than get their bearings they were overtaken with very severe and continued cold weather, which began about December 25, as mentioned above. A severe blizzard soon occurred with snow from 3 to 6 feet deep, requiring strenuous effort to keep the roads open, and making any movement about the camps very difficult. Then after a short rest, the process was repeated by the appearance of a second blizzard, with somewhat less snowfall, but more wind and damp cold. Subsequently the huge piles of snow had to be hauled away to avoid later floods. The consequence was that several other factors predisposing to disease were introduced and accentuated, namely, fatigue and exposure to the weather in unaccustomed clothing. The latter contributed to the production of many "colds," an epidemic of which was noted as having preceded the meningitis in the second regiment. A similar high incidence of other acute diseases among new recruits (72 per cent of the pneumonia; 57 per cent of the influenza) was also noted in charts prepared from cases during this period. The summation effect of all these factors is well shown in the comparative freedom from disease of seasoned men in other camps exposed to the same crowding and weather conditions; of the escape of young recruits in the detention camp when tenderly cared for; but the development of meningitis by unseasoned men when hastened to conditions of exposure.

The typhoid prophylaxis and vaccination administered during the detention period frequently caused considerable reaction, with fever and malaise for one to three days. The rôle of this factor must be relatively small, however, since the interval between the prophylaxis and the development of spinal fever was too long. In 79 cases transferred to the Naval Hospital during January and February in which the records of typhoid prophylaxis were available, the time interval between the third injection and date of transfer was in one case three days, in two cases six days, and in three other instances seven days. The intervals in all the others was longer. Schick's test had been performed on nine of the patients transferred during January and February with five positive and four negative reactions. With one exception all of these tests had been made more than a month previously. Only one patient had received Behring's serum, and that was given three days before his transfer to the hospital. His reaction to this serum had not been noticeable. Among 80 men vaccinated against smallpox, 62 or 77 per cent gave a positive reaction.

The age incidence of the patients seems relatively unimportant since the great majority of the men on the station are about the same age. Seventy-five per cent of the January and February patients, however, were between 19 and 24. The oldest patient in this series

was 29, as contrasted with the English report [1] where three men over 36 are mentioned.

Although with the lifting of the 21-day period of detention the young recruits were given liberty and leave, and frequented crowded theaters and street cars in near-by towns, the meningitis in these localities never assumed the proportions that it did on the station, and it is illogical to assume that they would be liable to contract the disease from these sources to the neglect of the much greater danger at home. It was also shown (December table) that as many of the cases occurred among men who had been on the station continuously since their arrival, as among those who had been known to "go ashore." Further, the section of the United States, or the town or city from which the recruit came originally or which he visited on leave, gave inconstant results in the few instances where this information was available.

Pharyngeal cultures previous to the disease had been made of nearly all of the patients, usually during the incoming detention period or as a contact of a case, and sometimes several cultures had been taken. Eighteen men who developed meningitis during December, January, and February had given negative cultures less than a week before their transfer to the hospital, and 15 of these had given negative cultures prior to that. (See cases 2, 9, 13, and 19 in December; 2, 16, 27, 34, 37, 38, 49, 53, 57, 68, 71, 74, 78, in January; 9 in February.) This is in accordance with the experience of Fildes and Baker [2] who obtained negative cultures from 26 men shortly before they developed the disease.

During December and January six men who had previously been found carriers developed cerebro-spinal fever. The results of their various cultures are shown in a table. The first man (J. C. D.) had been discharged to duty 11 days before developing the disease. The others were in isolation at the time. One carrier had been first discovered in incoming detention, two as hospital convalescents, two in outgoing detention, and one as a meningitis contact. The last man (D. S. B.), who had been negative in incoming detention, was cultured twice as a contact. On the first occasion two patients (Jan. Nos. 13 and 14) had been removed from the opposite end of the barracks from where he lived, and he was found negative. Eight days later another case (Jan. No. 36) developed in the same end of the barracks but the diagnosis was later changed to bronchitis. At that time he was positive and was shortly removed to a carrier barracks

[1] Flack, M.: Report on Cerebro-spinal Fever in the London District, December, 1915–July, 1916. Special Report of the Indicated Research Committee on Bacteriological Studies in the Pathology, Prevention, and Control of Cerebro-spinal fever among the Forces during 1915 and 1916. London, T. Fischer Unwin, 1917.

[2] Fildes, P., and Baker, S. L., Lancet, London, Oct. 20, 1917.

which soon became crowded, and where he developed the disease two weeks later. From the beginning of the work until the last of January, when this case developed, 1,228 carriers had been discovered of whom only 6 or 0.4 per cent developed the disease. Fildes and Baker[1] report that among 485 carriers not one developed cerebro-spinal fever, and they consider it rare among carriers. Capt. Flack[1] mentions five carriers who developed the disease while in isolation, and considers that every patient has been a carrier because the organism can always be recovered from the throat after the disease has made its appearance.

The important features of the epidemic at this station as detailed above may be briefly summarized as follows: The great majority of the men affected were young unseasoned recruits who had been rapidly rushed through the regular incoming detention camp at a time when the station was rapidly expanding, and sent to already crowded camps where they were almost immediately exposed to severe cold, stormy weather and hard work.

It is noteworthy that while with one exception (Feb. case No. 9), the young unseasoned recruits did not develop the disease in the regular detention camp where they were more carefully cared for, they were unable to withstand the combination of circumstances and depressing influences met in the other camps, although these same factors, operating on all alike, did not materially influence the older men on the station.

This same "hardening" process may also be seen in the incidence of meningitis among the several Army groups during this period, as indicated in the following table derived from weekly reports appearing in The Journal of the American Medical Association.[2]

Meningitis at Army camps.

	Annual rate per thousand, week ending—													
	Nov. 30, 1917.	Dec. 7, 1917.	Dec. 14, 1917.	Dec. 21, 1917.	Dec. 28, 1917.	Jan. 4, 1918.	Jan. 11, 1918.	Jan. 18, 1918.	Jan. 25, 1918.	Feb. 1, 1918.	Feb. 8, 1918.	Feb. 15, 1918.	Feb. 22, 1918.	Mar. 1, 1918.
National Army, all camps	3.2	4.1	6.6	8.3	7.4	5.7	4.1	4.9	7.4	4.5	4.0	2.9	2.9	1.3
National Guards, all camps	3.8	5.4	4.2	2.9	4.4	5.4	4.8	3.2	4.3	3.3	3.7	3.2	2.2	1.9
United States Army, Regulars	.2	0	0	.4	1.1	1.6	5.4	3.9	4.1	2.9	4.5	3.6	3.5	1.7
American Expeditionary Forces	3.8	...	...	5.5	5.0	...	2.6	5.7	...	...	1.6	...	4.2	6.0

The rate for 1916 among United States Army Regulars was 0.29.

It is seen that the highest incidence was in the National Army—that is, among the newest soldiers; and that in the National Guard.

[1] Loc. cit.

[2] Jour. Am. Med. Assn., Dec. 15, 1917, to Mar. 16, 1918.

composed generally of older men who had some military experience, it was less than in the National Army, but greater than among the seasoned Regulars. Among the latter the incidence rose when they met the new conditions operative in the overseas forces.

Carriers during the epidemic.—The incidence of meningococcus carriers among several groups before, during, and after the epidemic has been plotted against the incidence of cases, also showing the carrier index as derived from all sources. It will be seen from this curve (based on 32,590 cultures) that the epidemic of cases coincides with remarkable closeness to the cold weather, as indicated; while the increase of carriers does not begin with the cold weather or the cases (certainly does not precede them), but starts about two weeks later. The percentage of carriers remains high for about three weeks after the weather has begun to moderate and the cases have almost stopped, and then rapidly decreases with the advent of mild, fair weather. The incoming group, composed of the newest men, the best housed, and the best protected, shows the lowest rate throughout. The contacts, living under the same conditions as those developing the diseases, and exposed to them, give the highest rate at all times. Outgoing detention, comprising older men from all over the station, gives a somewhat lower percentage of carriers, and is rather comparable to the average curve computed from all cultures taken during each week from all sources.

Because of the very small number of men cultured on two occasions figures in two instances have been discarded as unreliable in making this curve—week January 19–25, detention 24.4 per cent; week February 23–March 1, contacts 26.7 per cent. During the extremely cold weather a charcoal foot warmer was used from January 20 on to facilitate keeping the plates warm, although hot-water bottles were usually found sufficient. On January 14, 15, 19, 21, 24, and February 15 contacts were cultured and the plates examined by medical officers who had formerly been working on carriers alone. Their figures have been generally somewhat higher, but that the new personal equation introduced did not materially affect the curve but rather confirmed it is shown by the fact that they took no cultures from January 24 to February 15, when the curve remained at its height; the figures from other sources rose correspondingly; and since February 18, when they have cultured all the contacts, the percentages obtained have fallen parallel with those before mentioned. The small elevation in all the curves during the middle of December shows the cases and carriers to be synchronous, but on plotting the daily figures the rise in carriers is seen to come a week later, and thus corresponds to the later curve, and gives additional weight to its outline, since the work during that period was very uniform in

character. Further corroboration of the real increase of carriers during this period is shown by the fact that without further variation in technique the curve came down and has remained down. From all of these considerations it seems justifiable to conclude that the incidence of widely distributed carriers came *after* the appearance of cases and not before, and was the result of the epidemic rather than the cause since in the presence of the greatest number of carriers the epidemic stopped.

The comparative harmlessness of these carriers is further shown by the following circumstances. After sending new men to the carrier camp steadily for several months, somewhat in excess of the rate of discharge, the quarters available for them had become nearly filled. Toward the latter part of January the incidence of carriers rose so rapidly that their usual accommodations were completely filled, including the available room in the naval hospital, where some of the more chronic carriers were sent. The carriers who were first isolated as suspects, could not be removed from the regimental cubicles, which became filled so that suspects could no longer be removed from quarantined barracks. Finally, a case of cerebro-spinal fever appeared among the crowded carriers (February, No. 9). About this time, January 28, when the case curve was falling and the carrier curve still rising, a new procedure was introduced by Surgeon O. J. Mink, United States Navy, the senior medical officer of the station, of whose administration, criticisms, and suggestions this report is largely the outcome. This procedure, which affected the last 10 cases shown in the January table and those occurring subsequently, has been substantially as follows: The contacts have been quarantined in their barracks for five days, cultures being taken from everybody but the carriers not removed and no one informed who the carriers might be. During this period, naso-pharyngeal sprays with Dobell's solution have been given three times daily by the regimental surgeon, and at the end of five days the quarantine lifted and all men returned to duty, although at this time public gatherings were interdicted and Y. M. C. A. buildings, etc., closed. The carriers who had already been isolated have been handled as usual, and more recently have been formed into companies, with regular duties on the station in working parties. They are now given one or two evenings liberty in the middle of the week, when the remainder of the men are kept on the station. Incoming detention carriers have been undisturbed. Carriers found by routine cultures made in outgoing detention have been withdrawn from the drafts and held on the station, but otherwise unrestricted. In spite of the more favorable weather conditions during this period, it appears significant that *the case curve continued to fall after the restrictions on carriers had been almost entirely removed.*

That close relationship exists between the patients and the carriers, as reported by some observers, has not been the experience at this station, although in January case No. 84 there was ample opportunity for carrier infection. The patient in this instance had been engaged in swabbing carriers and examining cultures for a month previously, during which time he was associated in the work with a man who at the time of his illness gave a positive meningococcus culture. In culturing many contacts, however, the highest percentage of carriers was frequently found among those least closely associated with the patient, as in the opposite end of the barracks separated by a solid partition with no indoors communication. (See December cases No. 12, 14; January cases No. 12, 13, 14.) D. J. C. (December case No. 14) had been isolated as a carrier, and yet when he developed cerebro-spinal fever 11 days after his return to duty and the whole company was cultured, 8 of the 10 carriers found were living in the opposite end of the barracks and never came in contact with him indoors. When carriers were found in the same end of the barracks, they were sometimes men who had been sleeping in the hammock next the patient, but just as often in the second, third, or fourth hammock distant.

A plot made of the sleeping arrangement of two barracks (426–E, 428–W) showed carriers scattered about without any obvious relation to the patients.

BARRACKS 426–W.

EAST.

F. M. W. F. W. Y.	C. A. K. G. P. K. L. A. L.
O. E. T. W. E. M. B. S. V. A. M.[1] F. E. B.	C. S. L. T. O. L. B. D. V. E. C. T. N. A. L.
H. K. T. R. M. S. W. H. R.[1] W. E. R.	W. L. M. C. C. M. F. R. C. E. W.
G. J. R.[1] J. R. R. A. T. P.[1]	J. E. P. B. A. M. E. P.[2] N. G. S. L. J. P.
C. L. P. C. J. P. J. M. P.	P. O. J. R. C. R. S.[1] M. O.
W. E. O. J. C. O. O. R. S. W. E. M. F. B. S.	J. O. N. A. J. S. G. W. V. H. W. P.
R. R. P. J. W. P. J. R. S. O. R. L.	J. A. P. D. A. L.[1] R. E. S. L. A. S. N. R. L.
N. G. M. W. F. N.	V. S. P. J. C. L. S. H. L.

NORTH.

SOUTH.

WEST.

[1] Carriers found January 29, 1918.
[2] January 28, cerebro-spinal fever.

Perhaps the success in tracing relationship of carriers reported by Capt. Flack [1] was due to the method of determining that a man was in close relationship before culturing him, whereas in the culturing done here all the men in the general vicinity of the patient were regarded as contacts and were cultured, while the degree of contact was disregarded until the carriers had been found.

Further discrepancies in the carrier proposition were discovered in a few instances in which a patient was transferred to the hospital with the diagnosis of cerebro-spinal fever and his contacts cultured, when the case finally proved to be some other disease. In spite of the small number of cultures, the results were similar to those obtained in bona fide cases of spinal fever.

Carriers among "contacts" of cases not cerebro-spinal fever.

Date.	Number of cultures.	Carriers.	Per cent.	Name of case.	Diagnosis.
1917.					
Dec. 19	50	2	4.0	P. B. H. (main brig)..	Acute tonsillitis.
1918.					
Jan. 1	165	7	4.1	J. A. C., 3 C. P. J.....	Meningitis, streptococcic.
Jan. 7	105	1	.9	T. G. B., 322.....	Epilepsy.
Jan. 11	129	2	1.5	No case, 425.....	Mistaken number.
Jan. 28	52	1	1.9	E. R. H., 122–N.....	Not spinal.
Feb. 4	57	7	12.5	C. W. M., 255.....	Acute pharyngitis.
Feb. 4	60	11	18.3	D. W. A., 231.....	Pneumonia.
Feb. 19	Dr. C. 96	12	12.5	L. F. N., 124.....	Measles.
Feb. 3	50	9	18.0	E. H. H., 529–N.....	Influenza.
Feb. 3	47	5	10.6	G. H. G., 231–N.....	Tonsillitis.
Mar. 8	Dr. C. 55	1	1.8	H. H. G., 330.....	Influenza.

When these few instances are plotted by weeks the curve that results conforms in a general way to the carrier index of the station for that period. (See chart.)

Somewhat similar results were obtained when the occupants of a barracks were recultured. On January 14, case No. 39 was removed from Barracks 421–W and case No. 53 was taken from the same barracks three days later. There being no available space for carriers all men were left in quarantine together without treatment while cultures were made on January 16, 18, and 22, after which carriers were isolated. On February 15, all available men originally present were again sought out, wherever their location, and the cultures repeated. This was again done on March 4. All plates were made and examined by the same technique.

[1] Loc. cit.

Repeated cultures in Barracks 421–W.

[Pos.=Positive by agglutination. 0=Negative (no characteristic colonies, or agglutination negative) Blank space=No culture made. *=Isolated as carrier Jan. 25 to Feb. 9, 1918, and discharged after one negative culture. I=Isolated Jan. 25; positive culture Feb. 9, 1918; and still isolated Feb. 15, 1918.]

Patient.	Jan. 16.	Jan. 18.	Jan. 22	Jan. 25–Feb. 9.	Feb. 15.	Mar. 4.
H. F. K.	Pos.	0	Pos.	*	0	0
E. A. K.	0	Pos.	0	*	0	0
D. L.[1]	0	0	Pos.	*	0	0
W. J. L.	.....	.....	Pos.	*	0	0
J. E. L.	0	0	0	.....	Pos.	0
H. J. M.	0	0	Pos.	1	0	0
M. M. M.	Pos.	0	Pos.	1	0	.....
F. M.	0	0	Pos.	*	0	.....
L. F. M.	0	0	Pos.	*	0	0
L. F. M.	Pos.	Pos.	0	1	0	0
D. D. P.	Pos.	0	Pos.	1	0	0
W. E. P.	Pos.	0	0	1	0	0
F. H. R.	0	Pos.	0	1	0	0
F. W. R.	0	0	Pos.	*	0	0
F. R. R.	Pos.	0	0	1	0	0
F. W. R.	Pos.	Pos.	0	[2]	.....	0
P. L. R.	Pos.	0	0	1	0	0
F. J. S.	0	0	Pos.	*	0	0
D. E. S.	Pos.	0	0	*	0	0
T. E. S.	0	Pos.	0	1	0	0
R. F. S.	0	0	Pos.	*	0	0
C. R. W.	Pos.	0	0	1	0	0
E. J. W.	Pos.	0	0	1	Pos.	0
R. P. W.	Pos.	0	0	1	0	0
C. W.	Pos.	0	0	*	0	0
Additional men negative	33	33	33	.....	28	27

[1] A carrier Dec. 7, 1917. Pos.; 4 successive negatives; Dec. 29, 1917 to duty.
[2] Furlough.

	Per cent.
Positive by agglutination Jan. 16, 1918	22
Positive by agglutination Jan. 18, 1918	9
Positive by agglutination Jan. 22, 1918	19
Positive by agglutination in first three cultures of all men	43
Positive by agglutination Feb. 15, 1918	3.8
Positive by agglutination Mar. 4, 1918	0

It will be seen that during the first week while 22 per cent was the highest percentage of positive cultures found on any of the three occasions, that 43 per cent of all men present were found to be carriers once or twice within that time. A month later 3.8 per cent were found positive, and two and one-half weeks after that, when the carrier index of the station was approaching the figures that preceded the epidemic, no carriers were found in this group. No new cases had meanwhile developed in that barracks.

After the occurrence of a case barracks were often cultured and carriers removed, when within a few days another case would make its appearance, both when the percentage of carriers had been high (see January cases Nos. 44, 50, 55, 73, 75) and when they had been low or zero (see January cases Nos. 6, 10, 12, 29, 31, 60). On the other

hand, in numerous instances new cases failed to develop not only when carriers were removed, but also when they were not removed regardless of whether the percentage was low (see February cases Nos. 8, 7) or high (see January cases Nos. 39, 83, 86, February Nos. 3, 6, 9, and 10). In this connection may be mentioned also the development of cerebro-spinal fever in a draft for an Eastern port in December, 1917. All had given negative cultures three days before leaving. Nevertheless one man developed the disease en route.

The more glaring defects and failures of the carrier segregation plan at this station may be briefly enumerated as follows:

(1) The nearly ideal application of the system failed to prevent or appreciably affect an epidemic, which ran its course and subsided with the cold weather after general hygienic measures had been instituted. The subsidence of the epidemic was unaffected, moreover, by the removal of restrictions on carriers, whose increase was the result rather than the cause of the epidemic.

(2) All of the real carriers present are never discovered at any one time, even with the most careful technique. This is best shown in the routine culture of chronic carriers, where it is seldom possible to get more than 50 per cent of cultures positive. Furthermore, during the 24 to 72 hours covering the investigation, some of the men held to be carriers may have lost the organism, and of those passed as negative a few may directly pick it up in a crowded barracks, Y. M. C. A., street car, or town (cf. table of repeated cultures in barracks 421–W).

(3) Carriers can not be traced in relation to new cases, except in a very few instances and they are not always closely associated with the old ones. In fact the greatest number of carriers has often been found among those least associated. Finally new cases occur or fail to occur without apparent reference to carriers who remain or are taken away.

(4) It has been found in general by most observers, with few exceptions, that the segregation and treatment of carriers does not give satisfactory results in hastening the disappearance of the organism. It does not seem logical to segregate men who have picked up the organism during chance contact with presumably only a few carriers, and expect that they will lose it while isolated in closer contact with many carriers, while to isolate each carrier in a single room is usually impossible.

(5) During the past nine months 1,363 carriers have been found on this station, and 120 cases of cerebro-spinal fever have developed. During one month only has the number of cases exceeded 20 but from 200 to 400 men have been in isolation constantly. When the efficiency of the general measure is not clearly evident it does not seem consistent with military economy to deprive the organization of 10

men continuously for every one whom it is hoped will be protected from a temporary disability.

That the ineffectiveness of this method is not a new experience is shown by the abstracted report of Meyer, Voltmann, Furst & Grieber[1] which is here quoted:

> They found 1.73 per cent of meningococcus carriers in over 9,111 healthy soldiers in the Munich garrison at a time when no cerebro-spinal fever was present. One examination was made of each man. One thousand nine hundred and eleven healthy persons were examined many, many times with the result that 2.46 per cent were found to be meningococcus carriers. Of the total of 11,022 healthy persons, about 2 per cent examined contained the meningococcus in their throats. Isolation of the carriers had no influence on the incidence of the disease, and epidemiologically they found only exceptional relationship between the carriers and the sick. In one of the years during this study numerous clinical cases occurred; in another year none, although the number of carriers remained the same both years. The authors conclude that extreme painstaking cultural detection of meningococcus carriers is unnecessary in combating the spread of cerebro-spinal meningitis; that the practical benefits do not justify the care and time necessary for such work. They believe that the chief foci, aside from factors not understood in the spread of this disease, seem to be the sick and especially mild cases.

In order to summarize the various clinical types of meningococcus infection that have been described, a classification might be made according to the degree of invasion by the meningococcus. Presumably the least degree of invasion would amount to merely a contamination of an individual's throat, a transient affair measured in hours. In increasing degree the following types would occur: Temporary carriers, measured in days, and chronic or persistent carriers measured in weeks or months; local infections of the pharynx, producing "sore throats;"[2] general infections, either of low grade and passing for influenza, etcetera,[3] or outspoken sepsis,[4] with a variety of metastatic involvements including meningitis itself. In accounting for variations in the type of disease Thompson & Wulff[3] conclude that meningococci vary in virulence at different periods, and that the virulence is enhanced by repeated passage through one naso-pharynx after another. They thus explain why chronic carriers rarely take or give the disease, but point out that during an epidemic of "colds," the organism is passed along, and becoming more virulent produces mild cases to be followed, perhaps, by an epidemic of the fulminating type.

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[1] Meyer, Voltmann, Furst & Grieber, Munchen Med. Wchschr., 1910, No. 30, July 26, abstracted in "Preventive Medicine & Hygiene," by M. J. Rosenau.

[2] Medlar, E. M.: Epidemic cerebro-spinal meningitis, at Camp McClellan, Jour. Am. Med. Assn., Feb. 16, 1918, p. 458.

[3] Thompson, O.; Wulff, F.: Meningococcus infection and meningitis. Hospitalstidende, Copenhagen, Dec. 6, 1917, p. 1192; abstr., Jour. Am. Med. Assn., Feb. 16, 1918, p. 498.

[4] Herrick, W. W.: Epidemic of Meningitis at Camp Jackson, Jour. Am. Med. Assn., Jan. 26, 1918, p. 227.

Granting the wide distribution of the meningococcus and its dissemination by carriers and patients as the basis of both propositions, the alternative explanation of the variable incidence and type of disease would obviously be that of a variation in the susceptibility and immunity of individuals themselves, as by the factors already discussed. Since control of the carrier is so inexact, and of doubtful efficiency, while harboring of the organism is of itself insufficient to produce the disease, it appears wiser to concentrate attention on the more general measures of proved value and easy application.

In addition to the avoidance of haste, crowding, exposure, and exhaustion in training recruits, all considerations of the utmost importance, other hygienic and sanitary measures available to combat epidemic meningitis may be briefly outlined as follows: The men who have been in indoor contact with a cerebro-spinal fever patient should be quarantined in as small groups as possible in commodious barracks with good ventilation and ready access of available sunshine. A nasopharyngeal spray with an antiseptic solution should be given at regular intervals to combat the organisms in the throat if possible, but more especially to accompany those which leave the throat in talking, sneezing, and coughing. Special attention and treatment should be given to men with "colds" and coughs, including instruction in properly screening others from an unavoidable shower of saliva. Curtains or screens may be placed between the hammocks or beds at night, as has already been instituted at this station by Dr. Mink. Light exercise may be taken outdoors, with proper clothing and protection from the weather, the danger of carriers being practically negligible in the open air. After a period of five days or a week, when the temporary carriers will probably have cleared up, and the chronic carriers become relatively harmless, the whole group may be discharged to duty. During an epidemic large and promiscuous gatherings, as in Y. M. C. A.'s or theaters, should be prohibited.

During a quarantine cultures may be taken and repeated at pleasure, with a preceding temporary suspension of antiseptics, and as a middle course during an epidemic the chronic carriers might be segregated to the extent of preventing contact with other men indoors.

It is unnecessary to call attention to the usual precautions in handling the patients, who should be isolated through illness and convalescence, and the desirability of masks for the attendants.[1] The recognition and prompt treatment of the mild and previously unrecognized cases will undoubtedly do much to prevent outbreaks.

[1] Weaver, G. H.: The value of the face mask and other measures, Jour. Am. Med. Assn., Jan. 12, 1918, p. 76.

CONCLUSIONS.

1. Epidemic cerebro-spinal fever is a disease caused by the meningococcus, which is spread for the most part by direct contagion from patients and healthy individuals. In military organizations the meningococcus has a predilection for young recruits, but is usually inert in the absence of depressing or resistance-lowering factors.

2. The arguments for isolating meningococcus carriers to prevent the disease are not convincing, since consistent practice on that basis has proved not only extravagant and against military efficiency, but also impracticable and noneffective.

3. The search for meningococcus carriers and their disposition should not cause neglect of the more generally effective and easily controlled measures of hygiene, of which the following are of the greatest importance: The prevention of crowding among young recruits; the allowance of ample time for their "hardening" and "seasoning;" protection from weather, overwork, and fatigue; and the use of all measures that will promote the general health of the camp.

The laboratory work reported here was done under Surgeon O. J. Mink's direction by Assistant Surgeons C. W. Barrier, W. E. Morse, R. M. Choisser, and D. R. Higbee, United States Navy, and Assistant Surgeon C. Koenigsberger, United States Naval Reserve Force. Valuable data were contributed by Assistant Surgeon R. R. Spencer, United States Public Health Service, while accuracy in the number and distribution of the cases was promoted to a great degree by the work of Assistant Surgeon C. J. Robertson, United States Naval Reserve Force, in checking up transfers to the Naval Hospital and following the diagnoses established there.

SPINAL FLUID IN RELATION TO ACUTE INFECTIOUS DISEASES OF THE CENTRAL NERVOUS SYSTEM.

By D. R. Higbee, Lieutenant, M. C., United States Navy.

So variable have become the manifestations of disease of the central nervous system that it may almost be said as a clinical axiom that no obscure case with nervous symptoms is completely surveyed without examination of the spinal fluid.

Previous to the year 1891 the cerebro-spinal fluid had been the subject of much speculation among physiologists, chemists, and pathologists. Many, indeed, were the theories advanced as to its origin, its analysis, and its functional relation to the anatomy of the brain and cord. In the year 1891 Heinrich Irenaeus Quincke, a German physician, invented a trocar and cannula for the purpose

of puncturing the spinal dura and obtaining fluid from the spinal canal.

Since that time both normal and pathologically changed spinal fluids have been subjected to the study of cytologists, chemists, pathologists, physiologists, and bacteriologists with a resultant massive accumulation of data which have been correlated with diseased states.

As a result of the very extensive examinations and researches which have been carried out it is now possible for the clinician and the technician to arrive at certain definite diagnoses and probable prognoses in diseases of the central nervous system and also to receive indications for certain methods of treatment.

It is only by a complete laboratory examination of the fluid that a correct interpretation of the pathologic processes developing within the central nervous system may be revealed. The lack of cooperation between clinician and technician has too often led to gross error in diagnosis, treatment, and prognosis.

Since the entrance of our forces into the war the assembling of large groups of men has kept us on the alert for the early detection of all contagious diseases, particularly meningitis. As a result much that is new has been disclosed and much that was formerly considered of little significance has come into its proper recognition. This advance has been made largely through the spirit of mutual helpfulness and cooperation which abounds in the military service. The laboratory worker has familiarized himself with the clinical aspects of this disease and has even been permitted to take charge of the wards where these cases are segregated. The clinician has also profited by visiting the laboratory and observing the methods followed for the detection of evidence of disease.

For example a new meaning has been given the term *clear fluid.* It has been shown that a water-clear fluid by actual count may contain any number up to 800 cells per c. mm. Consequently we no longer wait for a fluid to be definitely cloudy or under marked pressure before we consider the case one of meningitis or administer therapeutic serum.

Lumbar puncture as a procedure has in times past been regarded as altogether too serious a manipulation, and I believe in times present is much too lightly regarded. There should be definite indications for it when done and it should never be performed as a short cut to a diagnostic end. By so doing we depreciate our powers of observation and fail in conscientious physical examinations. I propose now to describe a detail in the technique of the operation which may be of service to those who work in the field where there is little opportunity to render the hands surgically clean. Select the exact

spot where it is proposed to insert the needle and touch this with the tip of an applicator immersed in iodine 10 per cent solution. Allow this to dry and then with the broad surface of the applicator paint the field of operation up to and including the edges of the small site selected for puncture. This small area will remain sharply defined. The first two fingers of one hand are widely spanned across this area, stretching the skin and holding it firmly against the spinous processes to prevent motion. The palm of the hand should rest on the back of the patient. The needle is engaged with the other hand only by the hilt and directed through the center of the small area selected. In this technique no gloves are required, and the operator's hands need not be specially prepared.

Every operation should be attended by the most careful consideration for the patient. It is only a matter of decency and an obligation that rests upon every operator to render the procedure as painless as possible. This can be easily and quickly done by needling along the line of the proposed puncture and infiltrating with any of the local anesthetics in 1 to 2 per cent sterile solution.

The fluid is usually collected in two sterile test tubes, because it so frequently happens that the first few c. c. are blood tinged. This first portion can be used for a Wassermann test after being cleared by centrifuging. For the cell count, the bacteriological culture, and the colloidal gold test, pure spinal fluid is required and the second portion is used. If the fluid is not blood tinged there is no difference to be noted and it may all be taken in one tube.

Inasmuch as the determination to do a puncture on a given case is based largely upon physical signs it is, of course, essential that the physician should acquaint himself with all the classical signs indicative of cerebral and spinal irritation. Physical signs are so intimately related to the anatomy of the parts that each sign elicited can generally be correlated with the localization of the process. For example, the Kernig sign when positive indicates an irritation of the lumbar region of the cord. When the leg is straightened out upon a flexed thigh the lumbar region of the cord and the plexus issuing upon it is put on a stretch and pain and inhibition by contraction of the extensor muscles will be elicited if there is irritation in the region. So also the Brudzinski neck sign is, when positive, an indication of abnormal tenderness in the cervical region. There is an inhibition shown by spasticity of the muscles of the neck and an attempt to overcome the stretching of the cord by flexing the thighs.

A sign which has hitherto been undescribed and so far as I am able to learn has never before been elicited will now be described. The arm of the patient is placed at the side of the body and a firm, steady pull is exerted at the wrist in the direction of the long axis of

the arm. This may also be modified by placing a soft but resistant roll in the axilla and finally pushing the abducted arm against the side. These manipulations stretch the large plexus issuing from the cervical cord. The sign is positive if the muscles of the shoulder and forearm inhibit the action and pain is produced in the back of the neck and head.

The first phenomenon generally noticed as evidence of an abnormal condition within the spinal meninges is that of increased pressure. The fluid is forced out in a stream and runs out in continuous flow. When under normal pressure the fluid comes out in a succession of distinct drops, and enough should always be withdrawn to reduce the pressure to this state whether or not serum is to be introduced, except in those instances in which the patient's heart action or respiration is seriously disturbed. Increased pressure usually accurs in all disturbances and diseases of the central nervous system, but is not of itself pathognomonic of any one condition.

The next evidence of an abnormal fluid is opacity. A normal fluid is water clear. The opacity is due to inflammatory products and cellular elements of the blood and endothelial lining of the canal. The opacity is of variable degree, and is only an indication of a serious lesion within the central nervous system usually an acute infectious process. But the fluid is not always turbid or even cloudy when such a process is present. Typically the fluid of tuberculous meningitis is water clear and under increased pressure. As stated above the term water clear is only a provisional description applied to that physical characteristic of the fluid. There may be as many as 800 cells to the c. mm. before any degree of opacity is perceptible. So in the early stages of any of the acute infections which typically yield a cloudy fluid at a later period, the fluid appears as perfectly clear. A microscopical examination for the exact cell count is the only reliable practicable way of determining whether a fluid has increased cells or not.

From time to time, usually following epidemics of certain infectious diseases of the nervous systems, articles have appeared in our medical journals detailing the results of a large series of cell counts and in substance tending to show that a differential diagnosis could be made by this method. One such instance in particular followed in the wake of the epidemic of poliomyelitis in New York City in 1916. The author attempted to differentiate poliomyelitis from spinal meningitis on the basis of a cell count. Nothing in medicine is less scientific. Any one who has a knowledge of the progressive tendencies of inflammation will readily appreciate that a high or relatively low cell count is a fairer index as to the stage and the acuteness of the process than of its particular identity or etiology. This rule, of course, would

not embrace those very virulent infections which are called fulminant and produce death before a reaction can occur.

Considerable attention must be given to the morphology of the cells found. This is especially true in dealing with the so-called clear fluids. There is infinitely more of diagnostic value in the morphology of the cells present than in the number. It is perfectly conceivable that a puncture may be performed at a time when the number of cells would disclose no information whatever and be within the limits of the cell count of any one of the disease processes to which the nervous system is subject. If the cells are found to be mononuclear our minds travel very different paths of thought than if they are polynuclear. In the former instance we think of noninfectious irritations, tuberculous meningitis, syphilis of the central nervous system. In the latter instance we are concerned with the various infectious meningitides which run a relatively short and severe course.

For the identification of bacteria cultural methods should be employed. It frequently happens that a reasonably certain diagnosis can be made by centrifuging the fluid and making stained smears from the sediment for microscopical examination. The sediment from a centrifuged sterile specimen should be heavily inoculated into a rich slant medium. First only a small area about the fluid of condensation is inoculated to instigate a good initial growth. Four hours later the entire slant is inoculated. The culture may be examined at 18 to 24 hours and subinoculations then performed with various sugar media to determine its fermentation reactions and with whole blood agar plates to determine the nature of its reaction with the erythrocytes.

The chemical analysis of the cerebro-spinal fluid is for all practical purposes limited to the detection of increased amounts of sugar and protein. Very complete chemical analyses have been made with so great a lack of uniform results that little value can at present be attached to them. Furthermore the methods are complex and the amount of fluid required is excessive.

There are several very reliable tests for the detection of an increase in protein. The Pandy, Noguchi, and Ross-Jones methods are all simple and are preferred by the writer. There is much to be said in favor of selecting one method and adhering to it. The accumulation of experience with a method is not the least important phase of the deductions which may be made from its results.

The protein in the normal cerebro-spinal fluid is derived from the blood by filtration through the choroid plexus and from the cellular excretion of the glandular cells. Whatever influences the greater permeability of this plexus and stimulates secretion will consequently increase the amount of protein. Such an increase, then, must always

be regarded as indicative of abnormal conditions. The etiology may be either traumatic, infectious, or toxic. The only deduction to be made is that there is irritation present. The amount of increase of the protein may be regarded as a rough index of the severity of the process. There is naturally a more marked reaction to an acute infectious disease with its toxic, irritating, and paralyzing powers and to an injury so severe as to create gross anatomical lesions than to a slowly progressing chronic process.

There is contained in normal spinal fluid about 0.4 to 0.6 gram of dextrose per 1,000 c. c. This is sufficient quantity to give a positive reduction of copper in the solutions of Fehling or Benedict. Benedict's qualitative solution is a little more sensitive than that of either Fehling or Haynes and the quantitative solution is a reliable reagent to use for measurement of the volume.

The sugar content in the changed fluids of meningitis cases is reduced. Several explanations of this phenomenon have been given. None of them are satisfactory. It has been claimed that the cellular elements increased in the fluid to so marked an extent absorb the sugar. The theory has also been advanced that the bacteria present use up a portion of the sugar in their metabolism. Very pertinent objections can be advanced against both of these statements. The cerebro-spinal fluid normally is not a satisfactory medium for the growth of organisms. It becomes much more nutritive and favorable to growth when the changed conditions which are present in infectious irritations prevail, viz., increase of protein. If the cellular elements absorbed the sugar present, then the centrifuged macerated sediment should disclose this fact when the test for copper reduction is made.

I believe that the natural law of physics can be successfully invoked for the correct explanation of this fact. Sugar is a dialyzable substance and normally penetrates the choroid plexus, but in the conditions where increased pressure prevails the tension is against this dialysis. Consequently the sugar content of the fluid is less than normal. This explanation may be correlated satisfactorily with the diseased conditions presented. The diseases which incite the greatest amount of increased pressure show the least sugar, often the total absence of sugar, e. g., cerebro-spinal fever and pneumococcic and streptococcic meningitis. The diseases which cause a less marked increase of pressure show a less marked reduction of the volume of sugar, e. g., paresis, tuberculosis meningitis, cerebro-spinal syphilis.

Further evidence in favor of this explanation is revealed in the examination of spinal fluids in patients suffering from systemic diseases which do not increase the pressure within the spinal canal.

In diabetes mellitus the sugar content of the spinal fluid is greatly increased and in renal insufficiency especially attended by high blood pressure the salt content is abnormally high.

SUMMARY.

A lumbar puncture should be done on every obscure case with symptoms relating to the nervous system.

This procedure should never be employed until a thorough physical examination has been made.

Every specimen of fluid should be subjected to a complete laboratory examination.

A clear fluid may contain as many as 800 cells per c. mm.

The number of cells present in the fluid depends upon the stage of the diseased process and its intensity. It is of no diagnostic value.

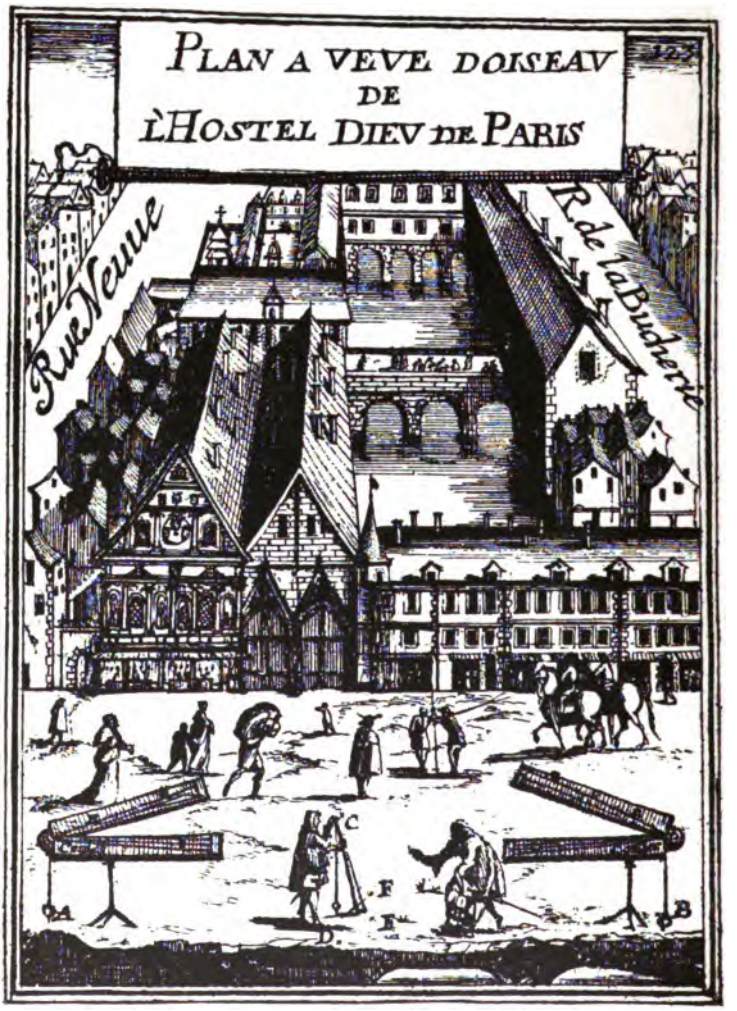
The differential cell count is of considerable diagnostic value.

No single finding except the recovery and recognition of a microorganism is pathognomonic.

A new physical sign to be elicited in cases of meningitis has been described.

An explanation of the decreased sugar content of the spinal fluid in meningitis is offered, based upon the physical law of osmosis.

The laboratory findings in the changed spinal fluid can be correlated with the stages of disease in the acute infectious meningitides.



BIRD'S-EYE VIEW OF THE HÔTEL DIEU, PARIS, IN THE SEVENTEENTH CENTURY.

E. Lecroisnier and Babé, Paris

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HISTORICAL.

THE HÔTEL DIEU OF PARIS.

Rome possesses in the Santo Spirito Hospital[1] the lineal successor of the largest institution of its kind erected in the middle ages. As Wylie[2] has suggested, the Ospedal Grande of Milan (founded in 1456 A. D.) furnished the model for our older type of block and corridor hospital. Lyons owed to Childeric, son of Clovis, and to Ultrogothe, his wife, a hospital founded in 549 A. D., which survived up to the fifteenth century. It is generally conceded, however, that the Hôtel Dieu of Paris is the oldest of the hospitals of Europe which have a history of unbroken service up to the present time.[3] Certainly no institution extant in Europe to-day has had a more varied and checkered career or been more closely associated with the fortunes of the people who resorted to it in their indigence and distress or patronized and supported it in their affluence.

Having its origin in the benevolent enterprises of the national church, being through many centuries under the direct control of the cathedral chapter of Notre Dame, and at the same time the special object of royal munificence and parliamentary legislation; because its doors were open to rich and poor, Jew and gentile, Christian and heathen, bond or free, and its ministrations to no race or creed confined; because its resources were derived from all classes of society—nobles of the court, wealthy burghers, the very beggars on the street—and, finally, because it was so intimately connected with the many vicissitudes of religious and social life through which the city passed, the Hôtel Dieu of Paris is to-day an object of affection and veneration to citizens of every type.

It is common to regard the modern hospital as an essentially Christian institution and as one which has its origin with the foundation of Christianity, but this idea is not altogether accurate. There is

[1] The institution comprises a hospital for every kind of disease, with 1,650 beds in ordinary times and double this capacity at need; a lunatic asylum with a capacity of 500 inmates; a foundling asylum through which some 3,000 foundlings pass annually.

[2] Hospitals, Their History, Organization, and Construction, by W. Gill Wylie, M. D., D. Appleton & Co., New York, 1877.

[3] The Hospice of Mont Cenis (A. D. 825) and the Hospice of St. Bernard (A. D. 980) were not hospitals in the ordinary sense. Baas, Hist. of Medicine.

reason to believe that long before the Christian era facilities for caring for the sick existed in Egypt and in Greece in connection with certain temples and the medical schools attached to them. In India hospitals were numerous and extensive fully three centuries before Christ, and it was not until the time of Constantine, three centuries after Christ, that the Christians themselves began to found institutions of this character. Nor is there any ground for the claim that Harun al Rashid and his Mohammedan successors were consciously imitating the Christian example when they started institutions of this kind in Arabia.

On the other hand, eleemosynary enterprises and charitable institutions, being typical of the Christian spirit, became more and more general with the spread of Christianity. The necessity for isolating the lepers, of whom there were many thousands in Europe, and the fear inspired by the contagious diseases brought back from Asia Minor by the crusaders caused lazarettos and hospitals to be constructed in large numbers. The proclivity of members of the religious orders to study measures of relief for sickness and wounds made monasteries and convents centers of medical aid and nursing, and the rules of hospitality which they practiced, the need for places of shelter at night when the prevailing disorder of the times rendered travel dangerous made it natural for the conduct of hospitals and kindred establishments to fall to the lot of the church, which took up the task more and more readily as its own organization was perfected and it acquired the authority and the funds necessary for the prosecution of all kinds of business. And so while in many cases hospitals were founded by bishops and other clergy, the Hospital of the Holy Spirit in Rome owes its origin in 1198 to no less a personage than a pope, and to one of the ablest that ever occupied the chair of Saint Peter, Innocent III. It was this Innocent who completed the work of Gregory VII, who made himself protector of Italy against foreign aggression and thus consolidated the temporal power of the church; who laid an interdict upon England and threatened England's king with a crusade; who compelled a King of France to take back the wife he had cast aside, and who interfered with the marriages of two Kings of Spain.

To-day we lavish money on marble, brass, tiling, and cement to make our hospitals fireproof buildings, capable of being maintained in the highest degree of cleanliness. The ordinary cleanliness of the housewife and the more minute cleanliness of the surgeon are the principal objects sought. Our poor and our sick who are sheltered by bare, undecorated, but sanitary walls are the objects of the same kind of love and charity which moved the people of the Middle Ages, when asepsis was unknown, to surround patients with objects of artistic beauty and to subject them to spiritual and religious

influences to lead them to God. Of hygiene, of bacteriology, of disinfection, the people of the olden time knew little or nothing, but of what they had they gave freely. Thus, in Pistoia in Tuscany, the Ospedale del Ceppo, built in the thirteenth century and remodeled in the fifteenth, has exterior decorations of rare beauty in colored terra cotta and enamel. Above the open arcade there is a series of groups representing the Seven Works of Mercy, the figures making a freize rich in color and light and shade effects. The Hall of the Sick in the hospital at Tonnerre is a beautiful timber-roofed apartment dating from the thirteenth century, and now used as a chapel, Margaret of Burgundy, wife of Charles of Anjou, the foundress of the hospital, and Louvois, war minister of Louis XIV, being buried in it. Beaune, most widely known for its wine, boasts a hospital so well constructed that, though mainly of wood, it is still in good preservation after nearly five centuries of existence. Its high-pitched roofs, dormer windows, and elaborate gables, its council chamber, its tapestries, and the mural paintings and altar pieces must have delighted the eyes of the beauty-loving people who went there to be cured at a time when our country was but one vast Indian territory. In the days gone by, pleasure was believed to contribute to convalescence, and pious patron, architect, and builder were trying to benefit the sick as well as to gratify their own instincts, when they enriched the hospital ward and the hospital chapel with carvings and pictures. In Santo Spirito, Rome, the wards were frescoed with scenes from the life of Innocent III and of Sixtus IV. Platina, the distinguished humanist, the papal biographer, the custodian of the Vatican library under Sixtus IV, composed the inscriptions for the pictures. The belfry of its church is one of the most beautiful and graceful towers produced by the early Renaissance. Its altar boasts one of the few works of Palladio extant in Rome.

In the spring of 1914 I spent many a pleasant hour wandering about the streets of old Paris, but grieving to observe at every corner how fast old landmarks were disappearing, for the straightening of streets and the frenzy of sanitary reform in Paris did not end with Baron Haussmann and the Second Empire. That part of the left bank of the Seine between the Petit Pont and the Pont au Double has a peculiar charm and interest for the sight-seer who is a doctor, for not only did Paris' great hospital, the Hôtel Dieu, occupy this site as well as part of the bridges just named and a large area of the island known as Ile de la Cité, but here was located the School of Medicine and this section of the town was the habitat and resort of medical students and their teachers. Dante in the tenth canto of his Paradise refers to the Rue du Fouarre or Street of the Straw. We

see in this name a reference to the straw on which students sat during lectures at their near-by school. Here is a congerie of queer old streets—Rue Dante, Rue du Rat, Rue des Anglais, Rue de la Bûcherie, Rue du Haut Pavé, Rue de la Juiverie, Rue St. Séverin—many of which are doomed to disappear as have so many others already. I searched in vain amid builders' high wooden fences for the ruins of the wall of Philippe Augustus, looked in for a moment at the Church of Saint Julian the Poor, which Baedeker says was once the chapel of the old Hôtel Dieu, and then sauntered down the street of the Hôtel Colbert, a building in the shape of a rotunda, used as a lecture room by the faculty of medicine for a trifling matter of 300 years and then as a school of anatomy. It is not far to the Medical School, with its museums and laboratories, and to the famous Hôtel de Cluny, where Mary Tudor, the "White Queen," enjoyed her merry sports and pastimes in that endless round of pleasure which brought her elderly husband, Louis XII, to the grave.

The Hôtel Dieu of modern Paris stands near but not on the precise site it originally occupied, having been reerected between 1868 and 1878 on the side of the great cathedral square opposite instead of adjacent to the small branch of the river. The buildings are thus lacking in those examples of mural decoration, of plastic art, of architectural charm found in establishments of older construction, though much of the original structure erected by Eudes of Montreuil, builder for Louis IX, remained unchanged almost to our own time.

The Hôtel Dieu of Paris was founded by Saint Landry, twenty-eighth bishop of the city, about the middle of the seventh century, when he assumed responsibility for the support of many poor people who sought asylum in his palace. He disposed of many treasures of the Church in order to meet these obligations and the year 660 has been assigned as the exact date of the selection of a special building for the case of the sick. It had been occupied previously by the nuns who had charge of the treasures and linen of the Cathedral of Notre Dame, and from its connection with the chapel of that name the hospital was first known as the Hôtel Saint Christophe.

Erchinoald, Mayor of the Palace and styled Count of Paris who died in 641, bequeathed land on which stood his palace and chapel for hospital purposes. (Felibien History of the City of Paris, 1725, Vol. 1.) In 829 this building was torn down and the first building intended specifically for the Hôtel Dieu was erected. This is not accepted by Chevalier,[1] who believes that when the bones of Saint Christopher were moved from Toledo, Spain, to Saint Denis, in 640,

[1] Alexis Chevalier in "L'Hôtel Dieu de Paris et Les Soeurs Augustines." H. Champion, Paris, 1901.

they were deposited in a chapel named for him, and that when under the patronage of Bishop Landry a hospital was founded here, the nuns from a convent near-by were persuaded to undertake the nursing of the sick therein. The institution was known as Saint Christopher's Hospital up to the eleventh century, though there is a manuscript extant, dated 1164, which alludes to the tearing down of the hospital and its reconstruction on the north shore of the smaller arm of the Seine.

The original name of the institution was Domus Dei, or House of God, and its motto was "Medicus et Hospes," or Healer and Host.

The primitive hospital consisted of four wards or halls capable of accommodating a total of eight or nine hundred patients. Of these, the St. Denis ward, to which were assigned those desperately ill, was erected through the munificence of Philippe Augustus. The Infirmerie, and the St. Thomas ward for convalescents were equipped largely by the contributions of Queen Blanche, mother of Louis IX (1210 A. D.). The new ward was for women. The basement of the latter was for maternity cases. The unfortunate situation of this ward rendered it damp and unhealthy, but the women awaiting confinement had to stay there, except perhaps the few lucky individuals who might be detailed to help with sewing in the linen room. There was a feeling that pregnant women were unsightly and so could be stowed away in an out-of-the-way place with the utmost propriety.

The location on the river had advantages and disadvantages. The stream certainly prevented other buildings from springing up in too close proximity to the hospital, thus reducing the light and the circulation of air in its vicinity, and it served as a sewer. The water-closets were located directly over the river and for a long time were connected with it by gravity alone.[1] The journey thither from some parts of the hospital was considerable and involved no little trouble for the patients and their attendants.

When a sick person passed the porter's lodge, was admitted as a patient and assigned by the sister, who presided at the entrance, to the proper ward, he confessed to a priest, surrendered his clothes to a caretaker, who saw that they were washed and cleaned, and carefully stowed away to be returned to him on recovery or sold at auction in case of death. He was then put to bed naked except for a nightcap, and it was a rare and unusual thing for the newcomer to enjoy a bed to himself. Usually the patients slept two and three in a bed and in time of famine or pestilence, when the wards were crowded, it was often necessary for six or eight persons to sleep together. The beds were large, four-poster beds, fitted out with one

[1] In the same way in the Hôtel Dieu at Amiens and in other houses of that city built on the Somme the water-closets overhung the river corbelwise.

or two feather pillows, huge bolsters and straw mattresses resting on cords in lieu of springs. These mattresses were made over three times a year. The supply of linen was plentiful, a thousand sheets being the allowance per week in wards, with a reserve of a thousand in the linen presses. There were gray quilts for use in cold winter weather. They were lined with fur from dog, cat, sheep, squirrel, or fox, several kinds to a quilt. The work of renovating the beds was done by nuns, novices, and convalescent patients and the completion of this huge task was invariably celebrated by a banquet.

Crude as were many of the provisions for the sick, we must remember that they were in harmony with the times and analogous to what patients had been used to in their own homes. It was not till very late in the Middle Ages that a traveler could expect a bed to himself at an inn,[1] and certainly among the middle and lower classes any special nightdress was a thing undreamed of. If a person did not choose to sleep in his clothes he slept without them. It was, however, a real hardship for the delicate and infirm to have to turn out at night and make long pilgrimages to the toilet, especially in winter, and with their clothes locked up. Each ward, therefore, had a supply of cloaks or dressing gowns and slippers, and the old records and chronicles contain frequent reference to the night nurses' specific duty of assisting the sick or the old on these expeditions.

The fact that no diagnosis was made on entrance and that patients were sent where there was most room meant that a madman, a man with a broken limb, or a case of smallpox might find themselves not only inmates of the same room, but actual bedfellows. Until Francis I, in 1535, founded a special hospital for children there were always from fifty to a hundred in the Hôtel Dieu, though there was no provision for them. Usually they were not sick, but accompanied their sick mothers because they had no other place to go. While we can condone lack of ventilation and limited heating facilities, it is terrible to think of children occupying a bed with the syphilitic or the insane.

Syphiliphobia became rampant during the last years of the fifteenth century, as the contagion had become very general in France and more particularly in Paris with the return of Charles VIII's army from its disastrous sojourn in Naples. Very strenuous efforts were made in Paris to segregate the victims of the disease, special houses being assigned them. One of these was in close proximity to the dwelling of the canons of Notre Dame, but these reverend gentlemen naturally took alarm and, following their vociferous representations, the patients were removed from that locality. Remarkable to relate, the general scare about syphilis died down before anything

[1] A stained-glass window in the church at Triel, Canton of Poissy, Department of Seine et Oise, shows three travelers in bed together at an inn, looking comfortable and happy.

definite had been accomplished in suppressing the disease and there has continued to be any number of cases of syphilis in Paris from that day to this, so that one does not have to go to Naples to acquire it. It is certainly interesting to note that the one class of unfortunates against whom the portals of the Hôtel Dieu remained ever closed was that of the lepers, the country being liberally provided with asylums for them.[1]

Primitive as were the arrangements of the Hôtel Dieu up to the beginning of the eighteenth century, it must have accomplished an incredible amount of good. Not only did it receive the sick but the poor and the destitute resorted thither for free lodging, beggars sometimes received alms there, and in time of war it sheltered also refugees and soldiers. Even when cured the poor patient was allowed to remain for another week, a well-meant regulation which unfortunately did not always bring good to the beneficiary, since it was quite common for convalescents to pick up some new disease on the verge of their departure.

There was progressive improvement in the installation and management and internal discipline of the hospital up to the fourteenth century, and from this time dates the most flourishing period of its existence. Patients were regularly admitted from 6 a. m. to 6 p. m., but in emergencies could gain admission at any time. During the eleventh and twelfth centuries there appears to have been no surgeon or physician regularly attached to the hospital, attendance being given by priests who had some notions of medicine or by sisters. The patients were fed twice a day—at 11 a. m. and at 6 p. m. Beside each bed was a rack or table for the earthenware wine bowl, the drinking cup, the wooden bowl, and wooden spoon provided each patient. There were three fast days a week for all hands. Mutton was the commonest variety of meat served. Beef was rare, and veal, lamb, or pork was only to be had on special holidays and feast days, perhaps ten times a year in all. The dietary included soups, eggs, fresh-water and salt-water fish, figs, grapes, sugar, oatmeal, cheese, and tarts. There was a definite allowance of milk for each ward daily. The dietary for fast days included cured and smoked herrings and onions preserved in oil, etc. Patients who were seriously ill received the best wine and fowl of all kinds—spring chickens, goslings, pigeons, and capons. If they had no stomach for meat, broths and jellies were prepared for them, but sometimes they could be made to eat it when it was served as a roast. For the milder cases, cod and whiting were good enough, but those who were very ill could have special dishes of

[1] In 1226 there were at least 2,000 lazarettos in France and ten times that number in Europe for the segregation of lepers and later for the separation of cholera and smallpox cases due to the crusades. The French leper homes were abolished in the reign of Louis XIV. Baas, History of Medicine.

small, delicate fried fish. Bread was baked in the hospital four times a week, and it was of three grades—ordinary bread, fine white bread, and brown bread. Other bread was bought outside or sent in as a charity. It was customary for the master bakers of Paris to make an annual visit to the hospital, upon which occasion they were expected to make a gift of six dozen loaves and an equal weight of pastry.

On holidays and fêtes herbs and flowers were strewn everywhere and counterpanes of bright color and "storied carpets" were put on the beds. There was a special room for such hangings and draperies and they were brought out but four or five times a year. Meanwhile the altars in Notre Dame were decorated and all the statues of altar or chapel were crowned with chaplets of roses. The holiday would end with a banquet, when there would be an extra allowance of wine and ample store of pigeons, goslings, and tarts. The fragments were carried to the poor, who were never forgotten. As it is a matter of record that the brothers and sisters looked forward eagerly to such holidays, it may be inferred that the lion's share of the banquet went to the worthy priests and pious sisters who ministered to the wants of the sick, and we can see no harm in this, for the laborer is worthy of his hire, and surely it would have been killing them with kindness to line the lean paunches of dying beggars with fat capons. Whenever the corporation of drapers assembled it was their custom to send to each patient in the Hôtel Dieu a measure of wine, a roll, and a piece of beef or pork, while each occupant of the lying-in ward received a plateful of food. The master grocers, bakers, and spice merchants were equally kind. Members of certain trades, seeking promotion from apprentice to master, were required to produce and exhibit before their judges a sample of their handiwork. Thus, the pastry cooks, when qualified, sent their masterpieces to the Hôtel Dieu after they had been inspected by the judges. The greatest windfall of the year was the annual banquet given by the rich guild of jewelers. It came at Easter. Each patient received a bowl of soup, a roll, a measure of wine, two eggs, a portion of roast veal, a cracknel, and a generous purse of money.

On leaving the hospital cured (or, as sometimes happened, merely disgusted) each patient got back his clothes, mended and cleaned, often with a shirt added and an extra penny or two in the pocket, and he was furnished with a certificate that he had been a patient in the Hôtel Dieu, which entitled him at need to receive further aid from the Hospital of the Holy Spirit of Paris (throughout the middle ages Holy Spirit was a favorite designation for hospitals). But auctions of the effects of the deceased were very frequent, as the

mortality was high. The dead were buried in a common trench of vast proportions, which was dug once a year and filled in a little at a time as sad occasion demanded. The still-born babies of the Hôtel Dieu and vicinity were disposed off in a peculiar way. Connected with the hospital was a tower, called the Tower of Limbo, having a central chamber filled with quicklime. One sister was specially designated as the custodian of the key to this chamber. Hers was the duty of throwing the little bodies into the lime "that they might be quickly consumed."

The munificence of some of the French monarchs did much to insure the permanence of the Hôtel Dieu, and in times of financial distress or when the demands upon the institution called for unusual expenditures an appeal to the king always brought relief. Philippe Augustus, Louis IX, Queen Blanche, his mother; Henry of Navarre and his son Louiv XIII, even Louises XIV, XV, and XVI, were conspicuous for their interest and practical help.

In 1209 a royal order assigned to the Hôtel Dieu the straw of the king's room and of his palace during the monarch's absence from the city. Reference has already been made to the architectural construction carried on under Philippe Augustus, Louis IX and his mother, to the generous contributions of various guilds, to the legacies of the canons of the cathedral. Saint Louis assigned a portion of the taxes to the Hôtel Dieu and exempted it from paying tolls on provisions brought to it by land or water. Under this ruler the custom of giving money and food (grain and herrings) to the poor of hospitals and lazarettos during the Lenten period was sanctioned by law. These ordinances were duly confirmed by Philippe V and Charles IV. A definite amount of wood went annually to the Hôtel Dieu from the royal forests, and officers and purveyors of the royal household were prohibited from commandeering for temporary use, as was done in case of private individuals, the horses, oxen, or carts belonging to the hospital. In return for the gift of wood the brothers and sisters of the hospital were responsible for carrying the sacred relics of the Sainte Chapelle to wherever the king might be when absent from the capital, provided the distance was not greater than 34 leagues, nor could this duty be imposed oftener than four times a year.

Philippe VI, founder of the House of Valois, and whose claims to the crown were contested by Edward III of England, leading to the Hundred Years' War, was a patron of the Hôtel Dieu. He initiated the practice of letting the hospital send its herd of hogs to feed in the royal forests, merely limiting the number of animals to 200 a year.

It became the fashion for the queen to visit the Hôtel Dieu every Good Friday, and, of course, a visit at such a time meant liberal dona-

tions from members of her court as well as from the monarch. In time, too, the custom sprang up of presenting to the hospital each royal cradle and of buying it back at a fancy price when needed, while on the death of a queen the furniture of her apartment was given to the hospital.

In the twelfth century the cathedral chapter passed an ordinance by which every canon was required to bequeath to the Hôtel Dieu his feather bed and sheets. Likewise, every canon who received a promotion had to make a similar offering. As we turn over the records of the hospital we come in the course of time to mention of a lawsuit before the Court of Parliament of Paris, brought by the Government commissioners of the Hôtel Dieu against the heirs of a certain canon, the complaint being that said heirs had turned over to the Hôtel Dieu the feather bed, bolster, and sheets belonging to the deceased, but no covering, tester, or curtains. The lawyer for the defense replied that the sisters no longer tended the canons when they were sick and so did not deserve liberal alms and legacies. The Procurator General, however, considered this countercharge irrelevant, approved the contention of the Hôtel Dieu, and ordered the deficiency to be supplied.

The revenue from all these sources, however, was relatively insignificant and not to be compared with that derived from the fines imposed and the confiscations made by civic officials of Paris. As the kings themselves often set the bad example of issuing a debased coinage, it was to be expected that the use of false weights and measures should be very general. Whenever the fraud was detected the foods and stores involved became the property of the hospital, which was largely supplied with candles in this way. During one period of the city's history the executioner was empowered to turn over to the hospital all stray hogs captured in the streets, and, though he only received a few cents for each animal apprehended, the annual gains from this bloodless duty were considerable. In 1418 Capeluche made quite a neat sum in this way.

One gets a striking sidelight on the critical situation of France just before the mission of Joan of Ark was accomplished and when two kings claimed the sovereignty and were actually acknowledged by different factions, from the record of two gifts made to the Hôtel Dieu. While the wife of Charles VII, the rightful ruler, sent 4 livres, the Duchess of Bedford, whose husband represented Henry VI of England, the rival claimant, sent a matter of 80 livres.

Henry of Navarre built two hospitals in the suburbs of Paris for syphilitic and contagious cases, thus carrying out plans made long before his day. More than this, he rebuilt the Saint Thomas and Saint Denis wards, his architect, Claude Vellefaux, substituting a

single arch for the previous double groin, a modification which helped to emphasize the passing of the Gothic style. Vellefaux was followed by his pupil, Gamard or Gamart, who constructed the Pont au Double and on this erected the Rosary Building, a two-story structure opening on the Rue de la Bûcherie. Even before coming to the throne, while still engaged in the terrible struggle which had reduced France to poverty and starvation, Henry of Navarre had shown an interest in the inmates of the Hôtel Dieu. It is not hard to believe that genuine sympathy as well as shrewd policy prompted him to send relief to the unfortunate patients of this establishment while he was actually besieging the city. We read that in 1591, while occupying Chartres, called the granary of Paris, he dispatched liberal provisions of wine and wheat to the Hôtel Dieu. It was by such acts as this that he prepared the way through men's hearts to the throne, and many a Parisian burgher would have welcomed him to it even before the hated heretic had removed the last obstacle in his path by abjuring his faith. Throughout his reign the Vert Galant showed himself a lavish patron of the hospital and his example was, of course, followed by the court, whose members vied with each other in their display of generosity. It became the fashion to give and to give liberally.

During the declining years of Louis XIV the financial administration of the Hôtel Dieu became heavily involved and royal sanction was obtained for converting into cash a considerable part of the real estate owned by the institution. A huge lottery was also organized in this reign, the king being one of the chief promoters of the scheme and buying a thousand tickets. The tickets were on sale all over France, and the lottery netted a very large sum to the hospital. Under Louis XIV a statute was enacted, though not enforced until the time of his grandson, Louis XV, by which a levy was made on all money paid for admission to public shows and entertainments. Thus one-ninth of the price paid for tickets to opera or comedy in Paris went to benefit the inmates of the Hôtel Dieu. Still so dire was the need of increased revenue that these measures did not suffice, and, in addition to the collections taken in all the churches of Paris, a house to house visitation was undertaken to raise further sums and charitable women banded themselves together to contribute to the comfort and welfare of the patients.

From its very foundation the hospital had derived a very large part of its income from the legacies of devout or charitable persons. The Hôtel Dieu was beloved of Parisians and Frenchmen and there are scores and scores of documents extant which show how universal was the practice of bequeathing to the hospital clothing, furniture, money, lands, and houses. From the earliest times it had been a

pious custom to mention the hospital in one's will, and if, with the decay of earnest religious belief, pious custom changed to society's fashion the material gain of the beneficiary was not reduced. Everybody left something to the Hôtel Dieu, from the king to the humblest artisan in his dominion. The Dukes and Duchesses of Berry, Brittany, Artois and Anjou, and the king's barber and his wife, the seller of parchment, the prosperous fish monger, the Captain of the Bastile remembered the Hôtel Dieu when they came to die. Out of 48 wills filed for probate before the Parliament of Paris in the reign of Charles VI, 40 contained clauses in favor of the great hospital.

Cardinal Mazarin contributed huge sums to the Hôtel Dieu and heartily desired to have a special hospital built for convalescents in connection with it. He arranged for the suppression of the ancient priory of Saint Julian the Poor, which was falling into ruins. All its rights, rentals, and privileges were to accrue to the Hôtel Dieu and the ground and buildings were to be assigned to convalescents. Unfortunately the great cardinal's wishes could not be executed and the plan fell through owing to legal complications connected with the transfer of the property, but the great bulk of the testators, unlike cardinals, left wife or child whose support had to be considered, and so we find that a very large proportion of the legacies gave a life interest in the transferred property to wife, sister or cousin. It is interesting to read the records of these transactions because on each page we get a fresh glimmer of light on the history of Paris itself.

Among the earliest papers we find a brief and businesslike statement that Renaud Crest and Joan, his wife, on the point of starting for Jerusalem, relinquish in favor of the Hôtel Dieu their part of the inheritance of Agnes Battle, their aunt, in case they never return from the Crusade (February, 1225 A. D.).[1] Many legal documents are concerned with the rental of property deeded to the hospital. In 1190 the brothers of the Hôtel Dieu of Paris rented a house for a stated sum to one Bencelin and Sedilie, his wife, the Hôtel Dieu obligating itself furthermore to lend to Bencelin during his lifetime four mattresses and some pillows. About the same time one Renaud de Mello presented to the Hôtel Dieu a house situated near St. Landry. It was doubtless to enhance the rental value of this building that Philippe Augustus decreed that is occupants should be subject only to trial by the king except in cases of murder, homicide, theft, treason, and rape. It was the common practice also to assign to the Hôtel Dieu a definite proportion of the yield of certain vineyards, wheat fields, forests, and farm lands. One Simon, occupation not given,

[1] Archives de l'Hotel Dieu de Paris (1157–1300) : Bryèle, Imprimerie Nationale. Paris, 1894.

but styled *Vir Nobilis*, presents the Hôtel Dieu with a barn located not far from where the Hôtel de Cluny now stands. Adam, former king's clerk, presents to the Hôtel Dieu a house in a certain street, another in a certain alley on condition that a portion of the revenue from these houses shall be employed every year on the anniversary of the death of the giver to supply the patients at the Hôtel Dieu with whatever they may demand to eat. There was Perrenelle, who in her lifetime gave to the Hôtel Dieu a vineyard, exacting in return for it one hogshead of the wine made from its product for her own use. Among the humble benefactors of the great and popular institution we find harness makers, saddlers, blacksmiths, tick makers, weavers, pewterers, mustard makers, locksmiths, butlers, barbers, dyers, pastry cooks, and old-clothes men. A little higher in the social scale comes the sergeant of the schools of Paris, a king's cook, a beadle, a church warden, a knight, a librarian, an abbot, a grand chamberlain.

The names of the streets referred to in the various deeds are interesting. There was a rue des Anglais, des Peintres, de la Juiverie. like the old Jewry of London, the Street of the Harp, the Street of the Fishing Cat, Straw Street, Butcher Shop Street, and others which survive to our own time. In 1229 A. D. Herbert the Sempster, at Brie, brought suit against the Hôtel Dieu because from a house owned by it all sorts of things were constantly falling on his own house. He had to pay the costs and was told that he could remedy the situation by adding stories to his residence until it dominated the source of trouble. One broad-minded individual divided his estate between the Hôtel Dieu and four poor students of Paris to be selected annually by properly constiuted authority. Unremembered for face or figure, Alice,[1] washerwoman to the Bishop of Paris, has her small niche in the hall of fame, because she bequeathed her accumulated savings to the great hospital for the poor.

During the middle ages a very large revenue was derived from the sale of pardons and indulgences or their bestowal on generous benefactors of the hospital. Each year the master of the hospital solicited from the Pope the necessary bull authorizing the practice. When it was received the churches of the city would be crowded and likewise the chapel and buildings of the Hôtel Dieu. On the day of the pardon high mass was said at Notre Dame while the cathedral bells

[1] In turning over the archives of the Hôtel Dieu, of Paris, from 1157 to 1300 one is struck by the unusual character of the women's names in vogue during that period. Few of the names that follow are in use to-day, and the majority of them had disappeared by the sixteenth century:

Alix	Douce	Fauque	Lisiarde	Sanceline
Ameline	Edeline	Gille	Offenge	Sedille
Asseline	Elend	Havole	Odeline	Thece
Avole	Erchenoud	Hersende	Perrenelle	Theophanie
Aveline	Frembourg	Hesseline	Rance	Tiphaine
Basile	Eudeline	Mahaut	Richeut	

pealed. Fifty priests were on hand in Notre Dame to hear the confessions of strangers. Pardons were likewise published throughout the provinces, preachers selected for their eloquence being dispatched to the provinces to stimulate interest, and they were accompanied by brothers from the hospital who attended to the actual sale of the indulgences.

By a decree of Parliament passed in 1552 the care of all foundlings had been assigned to the Bishop of Paris, and there existed in the Cité, hard by the cathedral and espiscopal palace, a house known as the Couche, where these unfortunate creatures were received and cared for. In 1634 a widow woman assisted by two servants, under the surveillance of one of the directors of the Hôtel Dieu, did all the work necessary for the care of the foundlings. The pay of these women and the expenses of the Couche were defrayed by alms received at the portals of Notre Dame. "There, under the porch, on the left-hand side, it was customary on holidays to set out a wooden trundle-bed in which were deposited a few foundlings to excite the people to contribute to their support. The nurses stood near, pointing them out to the passers-by and to those going into the church and repeating this prayer: 'Do good to these poor children, worthy people.'"

The available funds for this work were scant while the number of foundlings to be cared for steadily increased. "Nearly all these poor little creatures died." The servants took little care of them; administered narcotics to make them sleep; sold them to beggars, to bargees, to persons who wanted to use them in connection with magic and necromancy. Fortunately M. Vincent de Paul got some of the Dames de Charité to inspect the place, and, as he had anticipated, they came away horrified, with the result that a small number were at once adopted and removed from the Couche, and in a few years the entire care of the foundlings of the Hôtel Dieu was assumed by this worthy society.

Thus the Hôtel Dieu participated in the general improvement of conditions which characterized the reign of Henry IV under the able directorship of his prime minister, Sully. As stated above, the first Bourbon made it the fashion for one's charities to center around a hospital. It would appear that the enthusiasm and zeal of some of the noble women who took to visiting the Hôtel Dieu passed the bounds of moderation, for we find the hospital authorities inviting them to come and watch the distribution of food, to observe the details of treatment, and satisfy themselves as to the care the patients were receiving, but while they were urged to require the sisters scrupulously to perform their duties, the lady visitors were earnestly requested not to take any of them upon themselves. Indiscreet

then as now, the worthy dames and misses soon required the imposition of still further restrictions. Thus in April, 1612, the hospital board strictly forebade the sisters to receive gifts of bread, wine, and meat, which bring more discomfort than profit to the patients in the long run and entail "much confusion." In the same year we find the authorities becoming aroused (perhaps through the agency of the lady visitors) to the annoyance that might come to the occupant of a double bed by the inconsiderateness of his bedfellow—as in dying overnight. It was ordered that every ward should have a couple of spare beds to which patients could be moved temporarily when it became evident that those sleeping beside them were about to die.

The winter of 1709 was long and rigorous. It was a bad time for France and especially for the poor and the sick. Louis XIV sent his gold plate to the mint and the Cardinal de Noailles, Archbishop of Paris, melted up his silver that they might devote the proceeds to the poor. There were 240 cases of scurvy at one time in the Hôtel Dieu. Patients lay four and six in a bed and on the floors, and many beds had been set up out of doors. By September the deficiencies in the hospital funds amounted to 349,000 livres and during the course of the year 4,500 patients, among whom 600 cases of scurvy, had been transferred from the Hôtel Dieu to the Hôpital Saint Louis.

Dueling was at this time a universal practice. On the most frivolous pretext swords flashed from their scabbards and through the most fine-spun notions of honor hundreds of noblemen lost their lives each year. In 1609 Henry IV had promulgated an edict on the subject, assigning all fines and confiscations, in connection with the suppression of dueling, to the benefit of the Hôtel Dieu.

The period from the middle of the fourteenth to the end of the fifteenth century was apparently that of the Hôtel Dieu's greatest prosperity. Absolute cleanliness prevailed in the wards. In a single year as many as 1,300 brooms were used in the buildings. Every morning the floors were washed by valets and there was a grand annual scraping and whitewashing before Easter. It is remarkable that about the beginning of this period running water was available for use in the wards, being piped to them from huge overhead tanks on the roof. Such an equipment naturally resulted in great economy of time and labor for the employees.

Though the records of the Hôtel Dieu abound in interesting details regarding the architectural structure, internal arrangement, and administration, and though there is a considerable literature dealing with the administration of this great asylum for the suffering and needy, though all the different phases of its career as a church institution whose purpose was to confer spiritual blessings as well as relief

to bodily ailment are handed down to us in detail, the references to the purely medical features are few and meager. There would perhaps have been ample time to record the doings of the doctors and surgeons had there been a feeling that such a record would have value, but apparently the professional men played but a small part in the life of the Hôtel Dieu and there seems to have been no regular medical staff connected with the hospital before the eleventh or twelfth century, the priests and nuns giving the required treatment as best they could. Still, there is some gratification and comfort in the silence of history regarding the doctors, since not a few of the names most conspicuously emblazoned on the history of the Hôtel Dieu are there held up to the obloquy of posterity.

With the beginning of the thirteenth century the master of the Hôtel Dieu made a definite agreement by which the services of a doctor and a surgeon were retained for the patients of that establishment. In 1221 a certain Hubert agrees to give his professional services gratuitously to the hospital. To this same epoch belongs Vincent des Bois, who not only offered his services free, but made a gift to the hospital of 40 pounds parisis. In spite of these worthy dispositions the affairs of des Bois did not prosper and penury overtook him in old age, when the master, in recognition of past services, granted him a small annuity from the funds of the hospital.

From the thirteenth century on the Hôtel Dieu was an integral part of medical instruction in Paris, and graduates in medicine were required to receive the master's robe either at the Hôtel Dieu or at the Mathurins.

By the fourteenth century the professional service at the Hôtel Dieu stood on still firmer basis. It was intrusted to two surgeons, who were required to take a solemn oath at the Châtelet before undertaking the "king's service" at the Hôtel Dieu.

During the Middle Ages there was no pharmacy in the modern sense at the Hôtel Dieu. The master bought from the spicers and grocers of the neighborhood the drugs and medicinal plants required. The concoction of simple draughts and the preparation of ointments fell to the lot of the nursing sisters, and it would seem that the earlier physicians relied largely upon very simple remedies, baths, exercise, and modifications of diet. Special provision was made for the bathing of patients. Stationary baths were not employed until very recent times, as it was found sufficiently easy and convenient to use portable copper tubs, which could be rolled into the ward and to the bedside as occasion demanded. The baths were hot, of course, and the water for them was heated in huge cauldrons intended for that special purpose. The lying-in department was managed by a nursing sister, the specific services necessary being rendered by a midwife with one assistant. The ob-

stetrical service was an important feature of the hospital and although from 60 to 100 children were present there at all times, some of whom had been abandoned on the steps of the building, while others had been brought there by sick mothers who had no place to leave them, but one wet nurse was permanently employed for the children at the breast.

The sanitary features of the hospital have already been alluded to, but it should be said that they varied considerably in different periods of the hospital's history. At one time we find it stated that there were huge fireplaces in each ward where fires could be lit in winter, and that in very cold weather it was customary to draw up and down through the wards iron wagons full of glowing coals. On the other hand, we find a worthy prioress complaining of the parsimonious administration of affairs and telling of how she had to burn the straw from mattresses in order to save patients from freezing, and there is a record of a joint complaint made by patients in regard to the quality of the food served and the temperature of the wards. It is impossible to read the history of the Hôtel Dieu, full of the petty strife of rival aspirants for control of the institution, full of the bickerings of envious factions among the nuns, full of the bitter struggle between the lay authorities of the Government and the ecclesiastical officers, without realizing how little human nature changes from age to age. Now, as in the past, the sick patiently endure pain, are the victims of dubious treatment and extortionate bills, and endure humiliations of all sorts without a murmur, but complain bitterly and promptly of insufficient heat and poor food, whether in an expensive room in a private infirmary or in the free wards of a charity hospital.

High up under the roof were windows which by means of cords and pulleys could be opened in summer time to improve ventilation. In the seventeenth century a supply of juniper wood was kept on hand, and a little of it was burned from time to time in the wards to drive away bad smells. The glass was stained so as to soften the light. At night the wards were in darkness except for miserable rush lights between the beds. It is noteworthy that within a space of 10 years' time in the latter part of the fifteenth century at least two donations were made to the Hôtel Dieu to provide lights for the toilets that overhung the river and for lighting the approaches to them. The site of the hospital on both banks of the smaller branch of the river and on two bridges favored dampness. Owing to its location in the basement, the lying-in ward was particularly bad in this respect. Worse still was the main washroom or laundry, where a number of the novices were employed all day in washing the hos-

pital linen.[1] When the river was high the laundry was often flooded, and it was considered a wise precaution to have a boat moored there and provide the boatman with a boat hook so that he could salvage laundress and linen if the tide threatened to bear them off.

The good nursing sisters had a passion for linen. It was abundant and of fine quality. Closets, shelves, bureaus, wardrobes, dressers, chests in hall and linen room, in ward and corridor were filled to overflowing. Once a month the prioress went to market. Early in the morning a cart would be hitched up, and accompanied by a brother and one or two sisters the prioress would start for St. Denis, her chaplain following on horseback. She returned late in the evening and next day the new linen would go to the laundry, the dyer, or the sewing room. The itinerant linen merchants passing through Paris never failed to go to the Hôtel Dieu to offer their wares, because they could often dispose of the entire lot there. The February and June fairs were occasions of great moment and many a hard bargain was driven at them. All the year around four sisters were busy from morning till night repairing, sewing, hemming, or cutting up bedspreads, bolster covers, sheets, and pillowcases. The big laundry and the small laundry between them occupied the whole time of nine sisters and six novices. They worked near what we might call the tradesmen's entrance, where boats made fast to deliver the butcher's supplies and the provisions and stores from the farms belonging to the Hôtel Dieu. It was here, too, that brothers embarked when going to visit remote estates to inspect the crops, collect rents, etc. When the clothes were all washed they were hung along the balconies to dry, but often so great was the quantity of linen there was no place outside and much of it had to be brought in and hung in the wards. Patients often complained of the dampness that resulted.

Mention has been made of the syphilitic patients who swarmed in Paris at the time of the Italian wars and of the wholly inadequate measures for their segregation. It is equally terrible to read how the place was overrun during the prevalence of the pestilence, and that by putting the beds close together they could accommodate 12 to 15 in each; and yet, but a few years before, the papal legate, Cardinal Duprat, had generously endeavored to provide the additional accommodations so greatly needed by purchasing two buildings in the vicinity for use until such time as another ward could be added. The buildings in question were known as the Chef St. Quentin and the Fishing Cat. When the new ward was finished it was known as the Legate's Ward and it held a hundred beds.

[1] "Let us realize how many girls there are at the Hôtel Dieu who all next winter will stand in the waters of the Seine, frozen up to their knees, in order to wash the clothes of the poor," said Gerson, preaching in the presence of Charles VI.

At this time provision was made for some 50 additional capes for the convenience of patients who had to get out of bed.

There have been many gross exaggerations about the number of patients lodged in the hospital at different times. Up to the beginning of the Bourbon dynasty the maximum of the Hôtel Dieu was probably between seven and nine hundred inmates, with three or four hundred as an average number in times of prosperity and peace. It is positively known that on the 14th of April, 1417, there were but 96 patients in the institution. It speaks well for the humanity of the times that when the plague invaded Paris in 1545 all infected prisoners from the Conciergerie were transferred to the Hôtel Dieu for treatment, and it was strictly enjoined that they should not be discharged on recovery without due notice to the jailer of the prison.

It is not until the seventeenth century that we obtain definite documentary evidence of measures instituted to insure the adequate professional care of the patients of the Hôtel Dieu. From now on, in addition to the two physicians attached to the hospital, there is a master surgeon with five apprentices. The minutes of the meeting of the hospital board on July 18, 1629, contain this entry:

> The said Millot, having been received as master surgeon at the said Hôtel Dieu and being fed, paid, and lodged, shall himself be on hand to exercise his functions with great assiduity in person and shall have under him five experienced and capable apprentice surgeons, also fed at the charges of the hospital. The apprentice surgeons shall not absent themselves without the authority of their master, nor shall they go out except when at least two remain for constant service in the wards and two shall sleep in the said Hôtel Dieu—that is to say, one shall be on hand to examine the sick who present themselves at the entrance and another to stand by in case of accidents.

On April 22, 1644, the medical and surgical staff of the Hôtel Dieu reported that within a period of a few days three lithotomies had been successfully performed and stated that in order to obtain uniformly satisfactory results special facilities should be afforded them for caring for this class of patients. After due deliberation the governors, recognizing the justice of the demand, directed that the new ward, previously destined for the sick members of the personnel of the institution, should be assigned to the lithotomy cases. From then on, in conjunction with the faculty of the School of Medicine of Paris, the Hôtel Dieu gave marked attention to this operation. During the year 1692 operations for stone were performed at the Hôtel Dieu 104 times with 18 deaths, a mortality of 17.3 per cent. In recognition of the signal success of the surgeons who had operated on and cared for these cases the management of the hospital voted them a special honorarium as a reward for what they had done and an encouragement for further effort. The chief operator received

200 livres, the second operator 150 livres, and the surgeon who looked after dressing the cases 60 livres. During the year 1708 operation for lithotomy was performed 97 times in this hospital, with a mortality of 21.63 per cent.

The Hôtel Dieu had always been a great center for instruction in midwifery and foreigners had been constant in their attendance, but in time this began to be regarded as a nuisance and was made the subject of a report by the prioress, the sister in charge of the lying-in ward and the head midwife, the women coming in person to the management and stating that "while formerly no surgeons from the outside were allowed in the lying-in ward and only within the past 10 years had the privilege been accorded to a few in the hope that they would behave with great dignity and prudence; now, not only do the women show extreme repugnance to being delivered by men: but it was observed with regret that some of the surgeons admitted to the lying-in ward abuse this privilege and indulge in licentious conversation and unseemly behavior, the mere description of which is forbidden by modesty, so that much scandal has been created and complaints arose, followed by reprimands, which produced no effect. Furthermore, inasmuch as it is indecent for men to be employed at deliveries except in cases of unavoidable necessity, when the senior surgeon of the establishment ought to be called and, in lieu of him, his senior assistant, the management is urged to grant no further admission to strangers." The hospital board, on December 31, 1720, issued an order forbidding the entrance of an outsider for any reason whatever, but it was found easier to deliberate and make rules than to carry them out. Exceptions were made in favor of certain English physicians, and they were permitted for three successive years to attend the obstetric clinics of the Hôtel Dieu. This was apparently done as an act of courtesy to the King of England. In 1725 the attendant of the Queen of Denmark was allowed access to the sacred precincts of the lying-in room.

We have given above one of the two unfavorable comments extant upon the behavior of medical men at the hospital. It is to be noted, on the other hand, that the doctors were not always satisfied with the conduct of the nursing sisters, and in the sixteenth century period of demoralization, marked by religious exercises and neglect of work, the charge was made that when the doctors gave orders for blisters, cuppings, and bleedings, their directions were not always carried out.

As we survey the 13 centuries of the Hôtel Dieu's existence the most prejudiced observer can not fail to testify to the devoted service and loving care bestowed by the nursing sisters upon their patients, and they were in the main generously backed up by the people of Paris and the civic functionaries and clergy of the city. There were

frequent disturbances and occasionally bitter contests, due to ambition and the struggle for control of the institution. Laymen were prompt to decry the management of the clergy, and the clergy were often jealous of outside influence, though always welcoming outside assistance. Politics often had a disastrous effect on the efforts to improve the hospital service made by participants in each side of the argument; but while the petty weaknesses and evil passions of human nature often checked for a moment they could not wholly arrest the progress of this noble institution nor check the better impulses of self-sacrifice and devotion of the bulk of the sisters.

The following extract, a sort of panegyric on the nursing sisters, is from the Livre de Vie Active, a manuscript of the second half of the fifteenth century, whose author, a canon of Notre Dame, was for years one of the proviseurs or commissioners of the Hôtel Dieu:

Consider, oh thou of delicate appetite, while before this door, what sauce thou hast for thy meal at the sisters' table, coming as thou dost from the wards of the sick laden with the odor of poor, needy humanity. How can they relish flesh in their refectory when they come straight from the sick and tidying them up after nature's humblest functions? Others have stood by, candle in hand, to give the dying Godspeed, or have on their lips a bit of thread left from sewing up a shroud, as the bell rang for breakfast. Oh, thou of dainty tastes, how couldest thou be hungry, coming direct from the wretched sick who could not eat, but forced down morsels without appetite? The moving services our sisters render before they are called to refection and the sorrows they have witnessed in the ward move them rather to pious tears than to pleasant hunger.

At the outbreak of the French Revolution the affairs of the Hôtel Dieu were at a low ebb. Not only had all sorts of abuses crept into the administration, but the buildings had become the scene of dirt and wretchedness. Dr. John Jones, of New York, whose labors contributed to the foundation of the New York Hospital, went to Europe in 1772 to study the subject of hospitals and buy medical and surgical apparatus under authority of the governors of King's College (now Columbia University, New York). He wrote:

The Hôtel Dieu—a vast building situated in the middle of the city—receives about 22,000 persons annually, one-fifth of whom die every year. It is impossible for a man of any humanity to walk through the long wards of this crowded hospital without feeling a mixture of horror and commiseration at the sad spectacle which presents itself. The beds are placed in triple rows, with four and six patients in each bed, and I have more than once in the morning rounds found the dead lying with the living; for, notwithstanding the great assiduity and tenderness of the nurses, some of whom are women of family and take the veil and piously devote themselves to that office, it is almost impossible, from the vast number of patients, to bestow timely assistance upon each individual.[1]

[1] Hospitals, Their History, Organization, and Construction, by W. Gill Wylie, M. D. D. Appleton & Co., New York, 1877.

The people in authority during this stormy period sought to reduce to a minimum the influence of the religious orders, but the sisters of the Hôtel Dieu were permitted to continue their noble function as nurses, provided they worked only as so many charitable and well-disposed individuals, no official recognition being given to their relation to the church.

By 1816 the Hôtel Dieu was again in excellent order, if we may trust the report of a capable and critical English physician [1] of that day, who, after a tour of Continental hospitals, said of it:

I thought that the hospital was much better kept than the greater number of private houses in great cities on the Continent.

There were 30 spacious wards, some containing as many as 90 beds. The buildings were well ventilated and as neat as could be expected. The bedclothes and curtains were clean and white and, the beds were good, though not made of iron. The provisions were plentiful and wholesome, the kitchen in good order, and the patients were found to be quite as neat as the patients of London hospitals. The visiting staff of the hospital consisted at this time of 10 physicians and 2 surgeons, with an ample number of assistants.

Almost from its foundation the Hôtel Dieu exercised a pronounced and beneficial influence on the other hospitals of the country, and we find requests from out-of-town hospitals, such as the Hôtel Dieu of Orleans, or Bourges or Blois, for the loan of a nursing sister to instruct in the methods employed in the great mother institution of the metropolis. Again, the provincial hospitals were in the habit of asking permission to send their own nurses to Paris to observe the routine of the great Paris hospital. In Paris itself the nursing sisters of the Hôtel Dieu were always in great demand to nurse private cases in the homes of noble and affluent families. This practice was the subject of endless debate between the sisters themselves and the supreme authorities, the latter claiming that these outside undertakings detracted from the interest and the energy available for the legitimate work in the wards of the Hôtel Dieu; that jealousy was apt to be engendered; that the strict discipline of the Augustinians was interfered with. The prioress, on the other hand, held herself to be the best judge of how to utilize the services of the sisters under her control and was loathe to abolish a custom which undoubtedly made for contentment among the sisters by giving them occasionally a refreshing change from the hard, unvarying monotony of the wards. Besides all this the outside nursing did much to popularize the hospital and the order, thus bringing in large returns for the benefit of the poor and many welcome gifts to the sisters themselves.

[1] Carter, H. W., M. D., F. R. S. (Edinburgh). A Short Account of Some of the Principal Hospitals of France, Italy, Switzerland, and the Netherlands. Thomas and Underwood, London, 1819.

But the nurses of the olden time were prone, like those of to-day, to gossip and tell tales, and on at least one occasion serious trouble resulted. Perrenelle la Vertjuse had gone to nurse the wife of the King's commissioner at the Châtelet. Either during or after the course of her ministrations Perrenelle indulged in rather scandalous talk about the commissioner's mother and a serious row followed. Perrenelle's punishment was to stay in the hospital for one year without going out and to eat her meals off the floor every Friday until the All Saints' Day following the commission of her offense.

In the year 1368 a fierce contest developed between the prioress, one Philippa du Bois, and Stephen Fouchier, the master, over a question of authority. Eustachie de Provins, one of the nursing sisters, had asked permission of the prioress to leave the Hôtel Dieu and been refused. She complained to the master, who authorized her leave of absence in defiance of the prioress's refusal. At a meeting of the cathedral chapter on December 13, 1368, the prioress lodged a formal complaint against the master, charging him with usurpation of her authority and setting forth her case with great clearness and vigor. Thinking, doubtless, to conclude her argument by a telling blow, Sister Philippa closed her appeal by a caustic reference to the dangers arising from any association of the master with the sisters and cited the case of Marguerite de Chiele, a sister of the Hôtel Dieu, who for 14 years had been confined in the prison belonging to the cathedral chapter, in expiation of the crime of infanticide proved against her. The inference from the prioress's attack was that a former master of the Hôtel Dieu had been copartner with Marguerite in sin. Whether Philippa's *argumentum ad hominem* was inspired by the pitiful case of Marguerite or by desire to leave no stone unturned to prejudice the chapter against the master in authority in her own day, the documents do not reveal, but one happy consequence of the reference to the poor prisoner was that she was forthwith liberated from her dungeon and restored to duty in the hospital, though suffering the degradation of being forbidden to wear the veil like the other sisters, being compelled to lose her old place at the table, and reduced to the humblest position in the establishment. The main contention of the prioress was not sustained, and she, herself, was, by order of the King, removed from the Hôtel Dieu.

This incident is memorable because it marks the beginning of long and acrimonious controversy between the sisters, represented by the prioress, and other authority, usually that vested in the master. It is interesting, too, because it contains one of the two, and only two, distinct references to immoral conduct on the part of the sisters afforded by the documentary history of more than a thousand years.

The second incident is briefly referred to in the minutes of the meeting of February 8, 1409, in the following language:

> Because Brother John I———, member of the religious order of the Hôtel Dieu, and Sister Jane, of the above-named Hôtel Dieu, were discovered in sin it is ordained that the said sister shall leave the Hôtel Dieu for a period of two months. As to the brother, he is deprived forever of any duty in the Hôtel Dieu and shall be sent to jail for a period of one year.

Though ignorant of the circumstances which attended the "sin" in question, this example of fifteenth century justice attracts attention because, for once, the male sinner seems to have borne the brunt of the unpleasant consequences.

While the records of the medical service are scant, the documents relating to the organization and administration of the hospital, as a whole, are abundant and interesting. From them we learn that the responsibility for the conduct of the institution passed from the bishops of Paris to the cathedral chapter when the Hôtel Dieu moved to the north bank of the smaller arm of the Seine and became a part of the group of ecclesiastical buildings which occupied the bulk of the Ile de la Cité. Two members of the chapter were selected to act as overseers or proviseurs and exercise authority through the medium of a master chosen from the Augustinian Brothers. It was the master's special function to victual the hospital with the supplies coming from the country and to attend to the real estate in the city. He had charge of the farms and vineyards belonging to the institution, was responsible for the chapel service, the cellar, the bakery, the alms, the benefices, and accountability and returns of the great establishment.

The master and proviseurs together selected from the nursing sisters a prioress or mistress. Though the sisters were supposed to vote in the matter and record and length of service might give a certain sister prior claims, the master and the proviseurs were bound to appoint the person that they considered most capable and most worthy for the maintenance of charitable work and strict discipline.

The male members of the Augustinian order at the Hôtel Dieu were few in number and, in time, ceased to function, but the sisters have been associated with the venerable institution down to our own times. The brothers, for the most part laymen, never exceeded 30, and rarely reached that number, and by the sixteenth century had dropped to 6. The brothers and sisters lived as two separate establishments under the monastic rules and restrictions as to conduct which were common to all the religious orders. The sisters numbered 25 at first and by the twelfth century had increased to 40. In the seventeenth century they numbered 120. They began their career in the hospital service in a lay capacity and were styled Filles Blanches, or White Daughters, in reference to their costume, which

consisted of a white gown, a white cape and veil, a white surplice, and a guimpe. In the "Book of Active Life." already referred to, we read that "The dress had as little fit as a bag. One might have said it would fit one sister as well as another, and the first one up in the morning could don any one of the dresses and wear it as comfortably as any of the rest." At one period of their history it was proposed by the chapter to change the headdress of sisters and novices in the hospital. The civilian administrators objected, in view of the fact that no special object would be gained by altering a style that had prevailed from remote times and that had never been criticized by young or old before. "As for the headdress of the sisters, it is not only well adapted to them but a necessity, because, as it is more or less closed in and projected in front of the face, it does them good service when they communicate, as their profession requires. with the well and the sick, preventing these people from getting too near and really keeping them far away when they talk together. Then, being starched and fastened, the headdress keeps its shape so that the sisters can have their heads quickly dressed and undressed and the covering does not need to be laundried but once in three months, for all of which reasons a great deal of time is saved and made available for more useful occupations. As for the headdresses of the girls, if they are not ornamental to the face they are adapted to ease in the performance of the service which they are required to render the sick and to other duties flowing therefrom, because they are tight fitting in front, the pad being placed well back so that nothing interferes with working and moving freely, whatever they have to do."

Girls were eligible for the work of the White Daughters between the ages of 12 and 20, and after five or six years' service in this capacity could become full sisters, provided they served at least a year as novices prior to taking the vows. The death of a sister caused a vacancy, which could be filled by the election of a novice. The sisters remained on duty for the period of their natural lifetime unless disabled through physical weakness, in which case they could be cared for at the Hôtel Dieu. It usually took from 30 to 40 years to become a prioress. Their costume differed from that of the daughters in that they wore black surplices, capes, and veils.

By the thirteenth century the hospital organization was perfected. The bishops who met in council at Paris in 1212 demonstrated their wisdom and foresight by limiting the nursing staff to the smallest number of individuals compatible with a reasonably efficient service to the patients. They expressed themselves as unwilling to foster unduly the development of a monastic institution whose support would be derived from funds primarily intended for the benefit of the poor and the sick. The precaution of not concentrating too many members of a religious order in a single hospital was often forgotten

in the middle ages and the history of the Hôtel Dieu of Paris illustrates how readily abuses arise when the main purpose of an institution is obscured. The worthy brothers and sisters were always in danger of letting their religious piety and devotion draw them away from practical ministrations to the sick. It is remarkable that in 1636 we find the hospital board compelled to remind them that while it was a good thing to pray the principal function of nurses was to succor the needy, and the novices and White Daughters were told that if they stayed up until 11 o'clock at night for spiritual exercises they would be too tired and sleepy on the morrow to do good work in the wards. A peril of an opposite nature, the decay of vital religious feeling, was likely to produce equally unfortunate results to the patient by destroying the sisters' motive for enduring burdensome and repulsive duties and by inclining them to self-indulgence.

That these fears were not imaginary is shown by regulations passed in 1559 forbidding master, prioress, brothers, sisters, or White Daughters from gadding about town without special permission. At the same time strangers were not to enter the building or to talk, eat, or drink with the sisters. Priests and choristers were not to talk with sisters and White Daughters except about affairs connected with the patients and then only in public places frequented by all. Likewise it became necessary to forbid the employment of private servants when their number had gradually increased to a hundred, and all persons were forbidden to give or send or cause to be taken out of the hospital buildings bread, wine, money, or any other thing.

Though the prioress had specific charge of the nursing, yet in 1525 it was established that the master must see to it that all sisters and daughters in the hospital were thoroughly trained in "all the arts of caring for the sick." It was the prioress who regulated the coming and going of sisters and daughters, who behind closed doors imparted corporal punishment to those who had misbehaved, who cared for the linen room and the laundry, who looked to the general cleanliness of the institution, and supervised the sick and poor within its walls.

The brothers and sisters arose at 5 a. m. in summer and at 6 a. m. in winter, and after their ablutions betook themselves to services in the hospital chapel while the prioress made a rapid tour of inspection. This inspection was repeated several times a day and made at least once during the night. Matins over, men and women hurried to their posts in laundry, linen room, cellar, wards, etc. Night lights were extinguished and preparations were made for the work of the day. As one by one the patients woke up, the sisters appeared with basins and towels to wash faces and hands and clean finger nails. Patients who needed refreshment received something to drink. Then

the beds were made. Such of the sick as were able got up for a while, others being moved for a change to unoccupied beds. At 11 o'clock the first meal was served throughout the hospital. While some of the attendants remained to distribute food in the wards the rest trooped to the refectories, one for male, one for female workers. The two apartments were identical. The master in one, the mistress in the other sat alone at one end. The subordinates were ranged along the sides. Though the tables were spread with linen cloths, the tableware was of tin. A reader in each room read aloud during meals from some book of devotion. Brief prayers were said in the chapel and then work was resumed. During the afternoon patients saw visitors, and at 6 came supper. An hour later the master inspected his domain and caused all doors to be locked. Then the night nurses came on duty.

There were three so-called dormitories, but in reality only the quarters of the White Daughters merited the title of dormitory, for the rest each had a room to him or her self, simply but commodiously furnished. All the doors were locked by the same key.

From 1337 on, the night nurses received an extra measure of wine, thanks to the provisions of the will of a certain thoughtful canon, Eudes of Sens, who surely must have had some personal knowledge of how hungry watchmen and night nurses can become. Several times during the night the prioress could be seen making her rounds through the wards by the flickering light of a torch.

At the time of the row between Philippa du Bois, prioress, and Stephen Fouchier, master, feeling had run so high that the Provost of Paris summoned the contestants before the tribunal at the Châtelet, and finally Charles V, to quiet the unseemly disturbance, appointed a special committee of the canons to take cognizance of the affair and wind it up. Internal dissentions continued to interfere with the work of the hospital, and during the reign of Louis XI (1461–1483) public attention was again drawn to the irregularities that obtained there. The White Daughters became mutinous when transferred from the care of one sister to another. Nuns came and went as they pleased and slept outside the hospital when they saw fit. They quarreled violently or became unduly intimate with the priests, and in various ways a situation was produced with which the canons felt themselves unable to cope. They appealed to the municipality, and Louis XII in 1505 appointed 12 notable burgesses of the city as a bureau of administration for the hospital.

From this time dates the struggle for control of the Hôtel Dieu waged between the religious and civil authorities, which has continued down to our own time and thrown into the shade all lesser dissensions. That these dissensions had been far from insignificant, however, is shown by the account of the events connected with the

career of one John Lefèvre, master of the Hôtel Dieu in 1497, against whom suit before the Parliament of Paris was brought by the hospital authorities, charging him with various irregularities of administration. In the course of the trial the sisters and daughters, joined by a few of the younger brothers, made an attack on the room occupied by Lawrence Laisné, a priest who had been appointed bursar, whom they believed to be friendly to Lefèvre. Knives and axes were brandished, and cries of "Judas," "traitor," "robber" resounded through the building, greatly to the terror and discomfort of the sick. Poor Brother Lawrence was prostrated with terror as the door of his room fell to pieces under the shower of blows.

"What do you want?" he asked.

"You will know soon enough," said one of the sisters, brandishing an ax over his head.

There is no knowing what might have happened but for the resourcefulness of a sister nicknamed "The Cake," who, feeling that some crime would be committed, diverted the crowd from further violence by making Brother Lawrence promise that he would go and bring to the spot the hated Lefèvre. Later in the day—when the dean of the chapter and the proviseurs betook themselves to the hospital to remind the sisters of their duties to the sick, who were being wholly neglected—both male and female members of the order broke into open mutiny. They were joined by 20 or 30 of the patients, who jumped from their beds, and, in concert with the domestics of the institution, became so insulting and threatening to the canons that they had to withdraw and only just succeeded in escaping by the wicket gate.

The bureau of administration founded by King Louis was not a success. It held solemn assemblies and issued orders to which no one paid the least attention. Then, appeals would be made to the King, and everyone knows that while merry monarchs may bestow generous sums in charity they ofttimes seem disinclined to worry their heads about the fine points of other people's concerns. For 15 years John Lefèvre had managed the hospital to suit himself and made no pretense of keeping any accounts of his financial administration. Everything was in confusion and disorder. The burghers naturally could not immediately produce system out of chaos, and yet results and accurate reports were wanted at once. The new commission, charged with the reform of the entire service, showed itself dissatisfied with the conduct of religious affairs in the hospital and with the care given the sick by the brothers and sisters, whom they distrusted. They accordingly introduced from Flanders the Gray Sisters in the hope that they would be an inspiration and example for a renewal of energy and devotion in the wards of the Hôtel Dieu. This was a daring innovation and generally regarded as of

grave import. At first they were but 11 in number and did not carry sufficient weight to make any material changes or dominate the hostility and malice of the older section. Later, they were increased to 30.

Any serious reform of morals, however, was forgotten or laid aside, owing to the continued wrangling of the chapter of canons, the committee of the burghers, and the Paris Parliament, who were all at cross-purposes with each other and never got beyond mutual recrimination. The crying need was for an ironclad system of accountability and legible bookkeeping. This state of affairs lasted for 10 years or more.

Meanwhile complaints were being constantly registered by the patients. The sisters laid the blame for the deteriorated service on the greatly increased number of sick and the lack of accommodation for them. They claimed that they had no chance to attend to their legitimate work and at the same time prosecute their spiritual duties. This was offered as an excuse for the maintenance of over 200 convalescents to do the work of the wards. These convalescents misappropriated food by way of wages, and the nuns themselves were accused of stealing sugar from the dispensary. The sisters retaliated by accusing the proviseurs and masters, blaming them for the lack of heat in the wards, and declaring that the patients starved or froze to death. They were directed to be more patient and more painstaking with the sick, while the master was reminded that it was his duty to oversee the behavior of the sisters and to provide competent persons to instruct them in the art of nursing. Nothing came of this, and in 1526 we find the personnel of the Hôtel Dieu making common cause with the cathedral chapter against the Government administrators. In vain the doctors were directed to report the number of discharged and convalescent patients who remained in the hospital after they had pronounced them cured. The convalescents kept out of the way of the doctors and could not be found. When the prioress was questioned on the matter she stood on her dignity and asserted that she could not remember.

Francis I found time in 1535 to occupy himself for a moment with the Hôtel Dieu, and appointed a committee to investigate and report. This committee recommended the discharge of the master, John Petit and his confederate in peculation, Brother Julian Lucas, these worthies having apparently lived on the fat of the land, unbeknown to the chapter and contrary to their vows. This vigorous committee also removed the prioress and her understudy and replaced them by other women. The decisions were badly received by both brothers and sisters, and one of the latter became so noisy in her manifestations of disapproval that it was necessary to lock her up immediately.

Discouraged by the tumult and by the general situation of the hospital the chairman of the committee, Archdeacon Louis du Bellay, resigned his position, and in consequence a new investigation was ordered by the court of Parliament. The patients were called on and they testified loudly about the lack of heat in the wards and the poor quality of the food. Sister Joan de Costes, the assistant prioress recently appointed by the reformers, having been 14 years a member of the nursing order, testified that, moved by the pitiable condition of the patients, she often had been constrained to buy whiting and flounders to fry for the hungry in order to keep them alive, and that she had begged money for the purpose from relatives and others. She declared that during the two previous winters she had been constrained to burn the straw from the mattresses of the beds in order to be able to properly dry the sheets intended for the sick. She told how she complained one day to one of the governors, when he came into the St. Denis ward, that the poor had but one small herring a day to eat. To this he replied in these words: "When I am offered herring at the table I always take one of the smallest."

Sister Joan went on to relate how one day a poor townsman brought in two fish for his wife and a sick woman lying next to her. Having no fire with which to cook them she told the poor man so, and he, wild with anger, rushed out of the building by the gate opening on Little Bridge, crying: "Those big rascals, the women at the hospital, let the poor die of hunger, and if you take in food for the patients those women won't cook it even." On the morrow she went to the office of the governors of the hospital and related the above happenings and they said in answer: "Let them go to their houses and have their stuff cooked. We are not required to do it here."

Apparently the early years of the seventeenth century constituted a period of great deterioration in the character of the service rendered to patients. In 1634 a certain prioress, questioned about her authority, said that she had the same powers as ever to command but was now no longer well obeyed, as the daughters and novices attached more importance to the directions received from the sister assigned as their spiritual mother or guide than to the prioress' orders for service with the patients. "These girls," she said, "disdain to wait on the sick because of the spiritual exercises which the said mother lays upon them daily and which they find sweeter. They no longer care to occupy themselves with washing clothes, cleaning the poor, cutting their hair, paring their nails, and doing other necessary things, so that as a rule the head nurses have to get in women from the outside to help them."

A lady, deeply interested in the sick of the Hôtel Dieu and who worked hard in their behalf during the trying period of civil wars

between Henry III and Henry of Navarre, wrote in 1635 to the administrators of the hospital, complaining of the shortage of beds for the sick owing to the large number of poor people who were in the habit of going each year to the Hôtel Dieu to spend the winter. She asserted that the first ward could readily hold 24 additional beds and that the carpenter and mates attached to the institution could easily provide these beds in 6 or 7 weeks by working steadily. This worthy investigator found that often the night lamps were without oil, that the window-panes were broken, and the stoves inadequate. Only a fortnight before her complaint the door of the lying-in ward was left open and 3 soldiers came in and some ladies who happened to be at the Hôtel Dieu talked to them, contrary to order. Had the door been closed according to the ordinance of the managers such a thing could not have happened, to the great scandal of the Hôtel Dieu.

It was at this period that the porters were directed to stop the patients from going out of the building for the purpose of asking alms and returning at meal hours or bedtime. Likewise, under penalty of a whipping the doorkeepers were not to receive tips from the patients as they came or went. The sisters were not allowed to draw their rations of raw or cooked meat at the kitchen individually, as this made it easier for them to sell their rations and live off the food assigned to patients. The custodian of the patients' clothers was expressly forbidden to sell them lest on their recovery the poor should have to go out of the hospital naked. It was found necessary to put up in the laundry a sort of wooden passageway, regulated by lock and key, to prevent clothes, linen, or food from being smuggled out of the hospital by this route.

When a sister went to nurse a case in a private house notice was to be given by the master to the baker, the cellar master, and others, so that they might stop the issue of rations until her return. It was likewise the duty of the master to know the length of her absence and the house to which she went, so that he could ascertain the exact amount of money she had earned for the institution. Another wise and businesslike measure was the order to determine how much wine there was in the cellar and then decide, by the number of patients present, the amount to be issued to each one. The orders for the wine ration were to be signed every day by the physicians and surgeons of the hospital and sent to the cellar master to serve as vouchers in making up his accounts.[1]

Amid all these sordid details of human weakness the history of the hospital is illumined by the beautiful life and noble deeds of a

[1] Notes sur L'Ancien Hôtel Dieu de Paris, by A. Rousselet. E. Lecrosnier & Babé, Paris, 1888.

member of its nursing staff. Geneviève Bouquet, the daughter of a rich jeweler, was sent to court at an early age and entered the service of Marguerite of Valois. It is to be hoped that her contact with this dissipated daughter of Catherine de Medici and divorced wife of Henry of Navarre did not occur until after the queen's supposed conversion to the paths of rectitude, until the period when she was under the worthy influence of her almoner, the pious Vincent de Paul. At the age of 22 Geneviève entered the Hôtel Dieu, and for 15 years served as a White Daughter before becoming a sister. After a varied service in the pharmacy, the lying-in ward, and the other wards she was elected prioress, and continued to be a model of piety and practical charity until her death at the age of 74.

The founding of the society of the Dames de Charité, or Ladies of Charity, is commonly ascribed to Vincent de Paul, though as a matter of fact he actually opposed the scheme in the beginning. The idea originated with Mlle. Le Gas (Louise de Marillac), and the outline of the project was laid before M. Vincent by Geneviève Goussault, née Fayet, a rich woman of the better middle class in Anjou, widow of A. de Sauvigny, president of the Court of Accounts.

Vincent de Paul, who was prudence and discretion itself, hesitated to interfere, and put these worthy women off with the assurance that the able and wise persons, whose duty it was to administer the hospital, would take all the necessary measures and needed no help from without; but Mme. Goussault appreciated the benefit which would accrue not only to the patients but to the ladies themselves from an active participation in hospital work, and did not allow herself to become discouraged by the reverend gentleman's rebuff. When she realized that her continued appeals to Vincent de Paul were vain she boldly turned to the archbishop of Paris. Mgr. de Gondi, who saw at once the exceeding merit of the proposition and assured Vincent de Paul that he would be glad to have the undertaking carried out. Accordingly, the latter called a meeting of five ladies known to be interested in the hospital, and they agreed to associate themselves together for the purpose of visiting the Hôtel Dieu. On the Monday following, after communion, 10 people met to initiate the society, the noble mother of Fouquet, the minister of finance, being among the number. M. Vincent made a tactful speech, in which he explained that, as the visits of the ladies and their practical interest in the workings of the hospital might be expected to make public some deficiencies in the administration of the Hôtel Dieu, they would undoubtedly provoke some hostility. Accordingly, he urged his hearers to be more than careful in their attitude toward the sisters. They appreciated the point at once and displayed so much tact and grace in their work that they won the affection and esteem of the prioress and those under her from the start.

In 1634 the Association of the Ladies of Charity began its work. In trying to comfort the sick they did not limit themselves to words. They decided to provide for the patients a light meal between dinner and supper, and, accordingly, began their operations by hiring a room in the vicinity, where they prepared or stored provisions, fruits, dishes, linen, and useful utensils. About 3 p. m. each day bread, biscuits, jelly, preserves, fruits, either stewed or baked, were given out to the patients, the members of another society, the Daughters of Charity, founded by Mlle. Le Gras, assisting in the distribution. In the course of time this elaborate menu was somewhat modified, owing to the necessity for economy. Each day four or five women, simply garbed and wearing aprons, went from bed to bed through the wards carrying little gifts for the sick and the poor. It was their aim to minister to both physical and spiritual needs. They cultivated an humble bearing and tried to feel and to show sympathy for the ills of mind and body. In accordance with the wise directions of Vincent de Paul, they forbore to talk about themselves and tried to avoid the appearance of preaching. He urged upon the members of the two charitable societies the importance of wearing the simplest garb when employed on such a mission, so that, without any pretense of poverty on their part, at least they would not seem so far removed from those they sought to succor, and would not sadden them by the conspicuous contrast of their respective stations in the world.

It is not surprising that under such wise guidance the Dames de Charité soon had a membership of a hundred women, one-fourth of whom were members of the nobility. Two years after its organization it was deemed expedient to divide the work at the Hôtel Dieu in such a way that some of the ladies occupied themselves wholly with rendering spiritual aid while others devoted themselves to relieving physical distress. The pestilence of 1636 found both the Dames and the Filles de Charité at their posts, nor did considerations of personal safety interfere with their good works until they were required by their spiritual director to stop, two of the older women and one of the younger ones having died from exposure to the epidemic at the Hôtel Dieu.

In the minutes of the meeting of the board of directors of the Hôtel Dieu, under the date of August 26, 1705, we read that it was voted to continue to Master Petit, surgeon, his annual appointments, by way of testimonial and favor, so as to relieve the needs and infirmities of his great age. And in the deliberations of August 22, 1708, we read:

Master Petit, former chief surgeon of the Hôtel Dieu, being sick unto death, has sent to petition the board that after his decease his body may be buried in the church of the Hôtel Dieu, the which petition has been granted by the assembly in consideration of the services which the aforesaid Master Petit has rendered to the poor during a service of more than 60 years.

Other striking examples of heroism and devotion are furnished by the record of the great fire which on the night of December 29, 1772, destroyed a great part of the Hôtel Dieu. The fire originated in the chandlery of the hospital, and in a few moments flames were seen bursting from the windows of the Legate ward, the Saint Augustin ward, or Yellow ward, and Saint Jean ward. As the dean of the chapter and other functionaries were hurrying across the cathedral close to reach the scene of the disaster they beheld countless women, half undressed and weeping in terror, their natural alarm being heightened by the loud alarm which pealed forth high above their heads from the bells of Notre Dame. Forthwith the doors of the cathedral were thrown open, the nave was lighted up, and the refugees were directed to betake themselves thither. The fire having reached the dormitories of the novices, they were assembled and counted, and when it was found that no one of them was missing they were sent in haste to the cathedral, and in less than an hour they had prepared beds there with mattresses, pillows, and feather beds for the accommodation of the sick and injured.

Meanwhile sentries had been stationed at the portals of the church to prevent the entrance of all unauthorized persons, and valorous efforts were made to save as much property as possible from the burning building. From the chapel of the hospital the sacred vessels, cross, chandeliers, and various ornaments and vestments were removed to the treasure house of Notre Dame, as well as the birth registries and the records of burials and funerals. At the first rumor of the fire the procurator general, the president of Parliament, the lieutenant general of police, the head of the criminal court, the king's prosecutor, and other functionaries arrived, one by one. The doors of the hospital were ordered opened, but at that moment the chief night nurse, who had the keys, was busy elsewhere rescuing the sick and could not be found. An attempt was made to break the locks and so, when the keys were finally brought, they were of no use. The doors had to be battered down, and owing to their great strength this took a long time. Before the task was completed the firemen had arrived, accompanied by city watchmen and numerous friars of various orders. About 3 o'clock in the morning the archbishop arrived and, after observing the flames, entered the cathedral and visited the sick. He immediately took steps to furnish broth and wine for them. The dean of the chapter toward 7 o'clock in the morning received as his guests the sisters and novices and arranged for them to have something to eat. At 8 o'clock mass was said as usual and then the canons met to deliberate on what should be done to relieve the situation.

All day the fire continued to burn and lively fears were entertained lest the dispensary, the wine cellar with its store of wines and

liquors and barrels of oil should go up in flames. The city officials, however, by their promptness in isolating these portions of the hospital and by covering the cellars with fragments of old plaster work and other noncombustible material, succeeded in preventing further extension of the flames. All this time it was necessary to operate the pumps, which was done with difficulty on account of the great cold. By 4 o'clock on the afternoon of Thursday, December 31, the fire was completely extinguished and patients were carried back from the cathedral to such portions of the hospital as were still standing, as it was ardently desired to clear the church and prepare it for the customary religious services appropriate to the new year. That evening after their dinner the sisters to the number of 90 and the novices, 26 in number, passed from the large hall of the archbishop's palace to his audience room, and, having thanked him for his hospitality, fell on their knees and invoked his blessing.

During the two days that the patients of the Hôtel Dieu were lodged in the cathedral one woman gave birth to a child and 12 patients died. Owing to the cold, numerous braziers had been set up in the nave and lamps had been lighted all over the church in order to facilitate the work of the nurses in caring for the sick. Many were the wild stories afloat in Paris about the occurrences at the fire. Of the 500 patients in the wards that burned, not one, said rumor, escaped. Indeed, popular report claimed more deaths than the entire number of patients in the institution. The facts revealed by the legal investigation held on the spot established clearly that only 12 bodies were found amid the ruins, while a fireman and one of the city's militiamen were killed and 19 persons were wounded. One of the nursing sisters, alone and unaided, rescued and carried to safety 15 patients. The loss resulting from the fire was estimated at over a million livres.

It was in the reign of Louis XVI, under the able direction of Baron Necker, minister of finance, who was himself inspired by the counsels of his wife, an indefatigable hospital worker, that the reconstruction of the Hôtel Dieu was begun. When political intrigue had caused the fall of the great financier, the work went on without interruption according to the wise plans formulated by him.

By the eighteenth century the professional staff of the hospital appears to have been organized on modern lines. It consisted of seven doctors, one of whom was specially delegated to treat the priests, sisters, White Daughters, and novices. The others were assigned to various wards, serving in turn for four months in each. They made their rounds between 8 and 10 a. m. daily. Each was accompanied by an apothecary or surgeon to take down in a book the prescriptions ordered for the patients. These books were later taken to the dispensary, where the apothecaries and surgeons came to con-

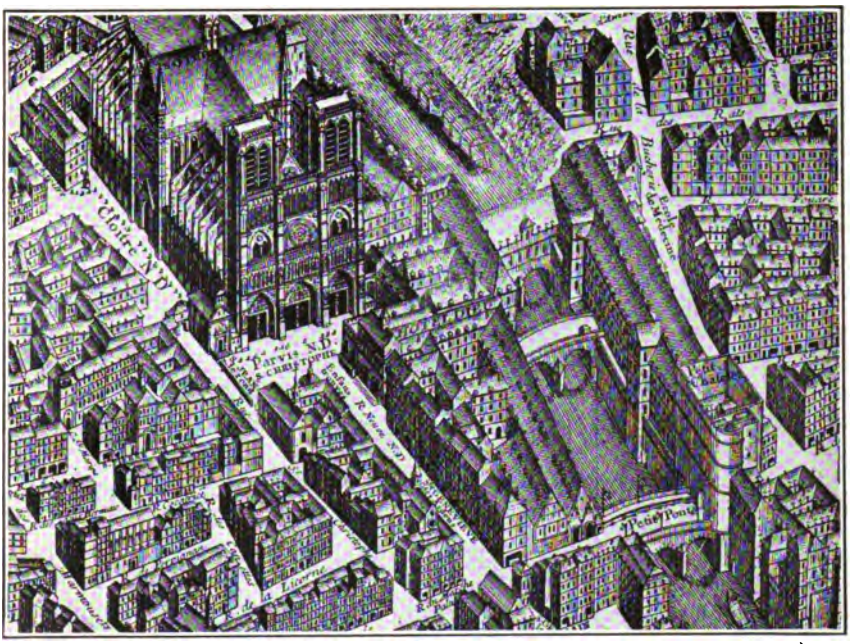
sult them for precise directions. The dispensary was in charge of a special sister, who gave out the necessary drugs and materials wherewith the apothecaries could make up sirups, plasters, ointments, etc.

The surgeons were of several classes. First, there was the chief surgeon, who was overseer of the surgery and surgeons of the Hôtel Dieu. He was lodged and subsisted and paid 600 livres in wages yearly. Under him was a first associate surgeon, with a salary of 100 livres and board and lodging in the Hôtel Dieu. Twelve other associate surgeons were lodged and fed in the building, but received no salary. The 12 associate surgeons were assigned to various wards and had under them externes to bleed patients, blister them, and perform other operations of minor surgery. Of these associate surgeons two were always on duty, day and night, to attend emergency cases, both of the hospital and dispensary type, and they slept in what was called the guardroom, so that they could be notified readily by the night nurses when they were wanted. At this time there were 21 wards, with a capacity of 880 beds.

It is interesting to compare the salaries of the medical officers of the Hôtel Dieu with that of the head midwife of the institution at this time. In the year 1737 we find Miss Langlois, head midwife of the Hôtel Dieu, reporting to the board of directors that she had always considered it a duty, during her long period of service, to develop a suitable understudy, capable of replacing her in need; that one Edmée Gouet, having shown herself throughout a period of 12 years in every way capable, devoted, and entirely fit to conduct the lying-in ward, is recommended to the place the present incumbent must soon vacate owing to age and weariness from long service. The board accordingly voted a salary of 200 livres a year to the said Edmée Gouet, to be increased to 400 livres after the death of Miss Langlois. Meanwhile the said Langlois was to be lodged and fed and supplied with heat and light and laundry service and was to receive 200 livres annually as salary in view of the good service which she had so long rendered to the poor, thereby wrecking her health and strength.

There are no statistics showing the maternal and infant mortality in the lying-in ward, but we know that the birth rate of the Hôtel Dieu rose from 1,264 in 1732 to 1,508 births in 1757.

About this time serious complaints began to gain circulation in regard to the professional ability and behavior of the doctors of the hospital staff. It was reported that instead of coming at 7 o'clock in summer and at 8 in winter to make rounds among their patients, they often did not come till 9, 10, or 11 o'clock in the forenoon, this to the great interference with the proper hospital care of the patients. Their rounds should last at least two hours, but instead were often



View of the Hôtel Dieu of Paris and surroundings in 1734.

Courtesy of H. Champion, 9, Quai Voltaire, Paris.

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made in half an hour, a quarter of an hour, or less. This indecent precipitation was not deemed compatible with a thorough study and treatment of their cases. Furthermore, it was alleged that the attending and other physicians constantly absented themselves on unauthorized and on unduly protracted leave. Maladministration and waste of funds were charged in connection with the dispensary, and the apprentice surgeons were believed to be engaged in petty pilfering of drugs, etc.

The minutes of the board's meeting of December 20, 1746, contain this horrifying entry:

> Three associate surgeons introduced some girls into the night-duty room and spent the night with them, and, having become intoxicated, committed all sorts of excesses. * * * Similar disorders are but too frequent. Instead of sleeping in the hospital, as they are required to do, the associate surgeons often get externes without experience or ability to take their places at night in the guard room or night-duty room, these substitutes being quite unfit to render the required aid to the sick.

These random notes on the history of the Hôtel Dieu would be incomplete without a brief reference to the efforts of the Jansenists to gain possession of the institution. The well-known sect of the Jansenists represented a struggle on the part of a portion of the Catholic Church to return to more evangelical standards and to invest worship and life with increased spirituality. It was in no sense a movement toward Protestantism, and its founder stoutly held to the Roman Church. The hostility of the Jesuits and the eventual condemnation of the movement by various popes, from Innocent X to Clement XI, and the determined and fanatical opposition of Louis XIV sealed its doom, though for a time the adherence of influential men and women at court, of prelates like the Cardinal de Noailles, Archbishop of Paris, of thinking men like Blaise Pascal, excited widespread attention and interest in the movement, which unfortunately degenerated to something not unlike some of the revivalist movements of our own time. The miraculous cures supposed to have been worked at the tomb of one François de Paris, a Jansenist of beautiful and holy life, led to the closing of the cemetery by the Government. It was this incident which occasioned the famous epigram:

> De par le roi, défense à Dieu
> De faire miracle en ce lieu;

which we may translate as follows:

> No miracle or wonder raising thing
> May God do here. By order of the King.

While the Jansenist doctrines were warmly championed by five or six of the canons of the cathedral, who deluged the public with Jansenist writings and songs and satires against the papel bull, *Unigenitus*, our interest here chiefly centers around the piquant

personality of a young girl. Marie Louise Claire des Tournelles, daughter of William Charpentier, Lord of Lunaisi des Tournelles and of Louise Marie d'Aubonne, was born on the 2d of February, 1679, grew up at the court of the Duchess of Maine, and constantly attended the balls and festivals at the royal court of Louis XIV until she was 22 years of age. Whether suddenly "converted" in true Jansenist style or acting on convictions gradually formed by the contrast between her inward thoughts and the worldly, licentious surroundings of court life we do not know, but on a certain day we find her getting up from her knees after long and earnest prayer in Notre Dame and hurrying into the presence of the prioress of the Hôtel Dieu to beg admission into the order of nursing sisters. We can picture the scene and readily appreciate the astonishment, almost horror, of the prioress when this fashionably attired young lady made her sudden appearance within the sombre walls of the hospital. Her lips were rouged; on her cheeks were black patches; in her hair aigrettes. The prioress expresses her surprise at a demand so unusual from one decked out in all the livery of worldly vanities. Mlle. Des Tournelles appreciates the incongruity of the situation, but says:

> Mother, harken to me and raise no objection to receiving me as I am, for I assure you that if you were once to let me out I might never come back to offer my services.

Then the eager postulant for admission begs that a message be sent to M. Lenoir, canon of Notre Dame, who knows her and will vouch for her. This is done, and on the prelate's strong recommendation she is admitted to the Hôtel Dieu to begin her apprenticeship as a Fille de Charité. On the 25th of June, 1707, Mlle. des Tournelles took the vows, adopting the name of Mother of Mercy.

Her relationship to the Marchioness de Montmorency and the frequent visits and communications received by her from members of this and other noble families and her close alliance with Canon Lenoir gave to Marie Louise a position of considerable importance in the Hôtel Dieu, and as the years go by we find her using her increasing influence to attempt a change in the very constitution of the order. Associated with her in the enterprise were Mother of Saint Gertrude, who had been selected prioress, though but 15 out of 80 sisters voted for her for that position, and other members of the order, her devoted friends and admirers. From this revolutionary enterprise sprang a long investigation and much discord. Under the régime of the Duke of Orleans, acting as regent during the minority of Louis XV, a board of inquiry deliberated at the Hôtel Dieu and called before it the prioress, and then, after some discussion, the Mother of Mercy and her following, consisting of some 19 or 20

devoted nuns. There had been much discord between the prioress and the Mère de la Misericorde, and it is doubtful if the breach was ever really healed, but the King's commissioner succeeded in making things smooth on the surface, and Jansenism in the person of Louise des Tournelles was thoroughly suppressed at the Hôtel Dieu.

Our authority sniffs at the temerity of Marie Louise in living and dying a Jansenist, and quotes from the horrified account given by Canon Le Gendre, a model of orthodoxy, of what the reformer tried to do in the Hôtel Dieu. Poor Marie Louise, who had discarded rouge and black patches and fine feathers to embrace a life of sacrifice and toil, must have had some prophetic vision of the organized charities, the hospitals, the settlement work of to-day, for, by the constitution which she and the Mother of Saint Gertrude advocated, "nuns would no longer have been nuns at all but merely members of an organization, leading an ordinary life, unfettered by rules, voluntarily associated together to care for the poor."

EDITORIAL.

A CAREER.

"My dear Surgeon General," writes many a young medical officer, while others who never come to the point of actually putting the words on paper plan night after night to do so as they lie awake in their novel and unaccustomed surroundings speculating and wondering, "I feel that I have a special gift for surgery and desire more opportunity for perfecting myself in this branch than is afforded me on this ship. I would like to be sent to our largest hospital and allowed to specialize in surgery, for which I feel myself peculiarly fitted. I have been very successful in surgery prior to joining the naval service and fear that my talents would be wasted on this ship, as there have been none but dispensary cases and medical cases during the month I have been on it."

Oh the glamour of surgery, the fascination of the title "surgeon"—whether naval, military, or civilian! All that history, fiction, or a fervid imagination has pictured flashes before the mind's eye and one is compelled to regard these young enthusiasts with tender sympathy. Who has not thrilled at the description of the surgeon working imperturbably, swiftly, skillfully, amid shot and shell, as Zola has described him, as he is reported in the chronicles of the Napoleonic wars? We recall the brilliant operators of the French school and the marvelous manual dexterity with which they amputated by transfixion, we realize what our leading operators do to-day and are not surprised that the definite and conspicuous results of surgery should entrance the tyro and that he should feel the challenge of a calling that offers daily chances of brilliant success or damning failure.

Even the grotesque figures drawn by Smollet and Marryat do not disillusion or daunt the aspirant for renown who enters the medical service of the Navy. He argues that all the portraits were drawn on the same scale; that admirals, captains, and first lieutenants were portrayed in the same ludicrous guise as the medical men, and if the former were heroes in spite of their foibles then the amazing creatures who sailed with them as surgeons were probably clever handicraftsmen.

Nor is it a misnomer for the naval medical officer to be called a surgeon. Surgery is an essential part of his work. No medical officer while available for general service and on cruising ships can abjure surgery as can the medical practitioner ashore, who politely refers cases to the surgical confrère on the next block.

However, the young man who enters the service with the idea that he will find there a large field for *specializing* in surgery is laboring

under a misapprehension and doomed to disappointment unless he can find gratification for his ambition along other lines. If he holds to his surgery, the sooner he leaves the service the better it will be for all concerned. The operator who tries to see how many hernias or appendices or gall bladders he can operate on between one cruise and another is simply depriving other men in the hospital with him of an opportunity to acquire that reasonable competency which *all* officers should possess in order that he may speak of the hundreds of operations he has done. Surgery should not be held out as an inducement to candidates for the Medical Corps, nor should individual preferences for special types of work be given undue weight in assigning to duty young medical officers still in a formative stage with ideas likely to undergo serious modification as they advance in knowledge of men and things.

There is no desire to argue anyone out of his tastes and predilections, but it is an indisputable fact that if a man confines himself to surgery and will condescend to deploy his energy, talent, and interest in no other line of work, he will in the long run be of infinitely less benefit to the personnel of the service than the good all-around medical man, competent at a pinch to do a little emergency surgery. He will remove the occasional appendix, enucleate the occasional eye, perform the occasional amputation, but the fever cases, the pneumonias, the contagious diseases, the venereal cases, the heart and kidney cases call for a volume of work exceeding the surgery a hundred to one, and medicine and surgery is not all. There is the ever-broadening field of sanitation, there is the military side of life, the pedagogic side, the constant call for administrative and constructive ability.

It is high time for the service conception of the medical officer and for the popular conception of the Navy doctor to be recast. We ourselves, after a survey of the past and a consideration of the future, must take account of stock and be prepared to adapt ourselves to altered conditions, discarding what is worn out, holding fast to that which is good. In order that the public may understand our comprehensive aims and the broad scope of our work, the Medical Corps, itself, must have a clear understanding of its opportunities and obligations. There can not be a reasonable degree of contentment among medical officers if on the one hand they are struggling toward ends impossible of achievement, and if, on the other hand, as capable and ambitious men, they fail to appreciate the diversified and ample range open to intelligent effort. Because preconceived notions of the naval service must be modified or surrendered, it must not be assumed that the service is without incentive to work or rewards for accomplishment.

If the attraction of the service resides in its military features alone, then, it should be entered by but one door—the Naval Academy.

In the next place no man should feel that by entering the Navy Medical Corps he is giving up the prospect of successful achievement along definite and specific lines to become a jack-of-all-trades and good at none. This view is entertained in some quarters. It is a very unfortunate view and is calculated to do harm to the service and to the individual, whether the individual is a patient or a doctor. The service will tend to expect less of men so regarded, to trust them less, to honor them less, and the individual medical officer who consents to be placed in this class is unconsciously sealing his own doom by consenting to mediocrity and inertia.

The line officer considers his life work a highly specialized profession and advertises it as such, and he is right. He may be less well informed about explosives than the chemist or even than the intelligent foreman of some large powder plant, but he knows the practical application of explosives for purposes of naval warfare. He may not be as deeply versed in the subject of engines as the man who designs and builds them ashore, and in other departments of knowelge he may have less expert ability than many civilians, but he will stand high in his profession if he successfully brings to bear experience as organizer and disciplinarian with skill as navigator, engineer, and artilleryman on the training and development of man-of-war's men and the upkeep of battleship, submarine, or destroyer against the possible day of battle. The fact that on the eve of battle help may be received from civilian chemist, engineer, electrical expert, inventor, and scientist of every kind does not reduce the merit or glory of the officer of the line whose general knowledge embraces the whole field of naval endeavor, coapting, harmonizing, and blending its various features into a great offensive and defensive agency.

It should be made clear to the young man who contemplates entering the Navy Medical Corps that he, too, is selecting a distinct and peculiar calling and one essentially different from that of the civilian practitioner or of any practitioner on shore, a real career different in its aims and requirements and essentially different in its rewards. He must not be allowed to think of himself as renouncing ambition, compromising with fortune or sacrificing high purposes of noble endeavor in exchange for guaranteed subsistence and freedom from anxiety in the years of declining vigor.

The physician who dons for life the naval uniform (and there is no possibility of contentment and peace of mind unless a man does take it up as a life work, one to which he is committed for better or worse) becomes part of an organization, living largely apart, peculiar to itself, little understood, a highly specialized, differentiated body of men. Their physical surroundings, their physical needs, and the physical details of their everyday life are complicated and peculiar. The function of the medical officer is to study the physical conditions

and requirements of naval life, to ameliorate them, to minister to them. The variety of the subjects within his scope is only hinted at when we mention the proper illumination of an officer's room, the working ration of an aviator, the medical aspects of deep-sea diving, the handling of an epidemic, emergency surgery, the training of a hospital corps, the sanitation of a recruit camp. The beau ideal of a medical officer not only knows well the subjects of medicine, surgery, therapeutics, chemistry, ophthalmology, genito-urinary diseases, dermatology, obstetrics, bacteriology, and hygiene, but is especially good in one or more of these branches, and has the power to set forth his views clearly and convincingly by tongue or pen. He is a man of wide reading and much general information. He has the tact and patience and intelligence which enable him to secure from superiors favorable attention for his recommendations and to win the confidence and affection of his juniors, to command the respect of all in the close juxtaposition and the trying intimate relations imposed by the conditions of life at sea. From the rising of the sun till the going down of the same and into the silent night watches everything that bears on the life of a sailor has an interest for him and furnishes him with food for thought and investigation.

In a word, the Navy surgeon is a specialist, and he has a very peculiar specialty. One of its anomalies is the fact that few appreciate the distinctive features of his calling. To a large number of people ashore a naval surgeon is an agreeable fellow of some education, perhaps culture, with a hearty, jolly manner, and plenty of time on his hands. The popular conception of the Navy line officer has until recently been equally inaccurate and unfair. With the passing of the wooden ship have gone forever the days of elegant leisure, the long stays at Villefranche and Yokohama. The warship of this generation is a workshop and all hands are busy.

Just as it would be wrong to compare a line officer with Edison or Maxim, so it is wrong to measure the attainments of the Navy doctor by those of men eminent in a single, limited field of professional work.

Dr. Hide's opinion on some obscure disease of the skin may be worth $20, but how many years have passed since he set a fracture or attended a case of pneumonia? Dr. Cutter's fame as a surgeon has been greatly enhanced of late by his wonderful success in removing tumors of the brain. He would doubtless turn aside from his hobby and do a very neat appendectomy for you for a matter of a thousand dollars, and if you talked poor when the bill came in he might knock off a couple of hundred, but would you trust to his judgment in diagnosing some tropical malady or conducting a campaign against an epidemic on shipboard? The great Prof. Iris is known the world over for his cataract operation, but he has not

treated a case of gonorrhea since he had it himself as a medical student.

These men are invaluable ashore because there are enough of them to supplement each other and make up for individual deficiencies, but would it not be truly a hardship for officers and men starting on a long cruise if they were restricted to the professional ministrations and tender mercies of but a single one of this learned assemblage? The public, most generously and sympathetically disposed just now under the stimulus of war conditions, probably holds that the country's brave defenders at sea, in order to be adequately treated when sick, should have with them as many experts as there are specialties in medicine. Fortunately the sailor knows that if the sick bay were stocked with a complete outfit of these people the ship would be dangerously down by the head. It is impractical, ridiculous to think of providing a whole faculty. What can be furnished and is furnished is the man of reasonable competence in a preponderance of the problems which may arise. The naval surgeon is not the equal of the most eminent operators ashore, but he is superior to them in medical knowledge. He is not the equal of the distinguished internist ashore, but he is capable of doing good emergency surgery, whereas his superior in internal medicine would undoubtedly fight shy of a bistoury. His knowledge of the eye, ear, and throat are limited, but he appreciates his limitations. It is his ambition and constant aim to be as good as he can along as many different lines as possible.

This conception of the naval medical officer may well stimulate the ablest, the best equipped, the most ambitious man. To the one with a leaning for surgery, a period of temporary inactivity along this line will but give opportunity for brushing up on the eye or skin or nervous diseases. The man whose passion or diversion is bacteriology will, when sent to recruiting duty, have an opportunity to come in contact again with men and to reinforce his previous studies of human nature by fresh observation of its vagaries.

With a due appreciation of the nature of his career, of its opportunities and duties clearly fixed in his mind, the medical officer will be able constantly to relegate petty vexations and disappointments to the subordinate place where they belong. He will have no time to brood over wounded sensibilities and worthy motives misunderstood. Dissatisfaction because a given suggestion was not acted on will be brushed aside by the lively consciousness of the infinite number of things to be learned if a medical officer is to be up to date, well informed, ready with sound, expert advice when it is called for and urgently needed.

FUNCTIONAL AND ORGANIC LESIONS.

A prolific source of mistakes in the examination of recruits, especially when conducted by civilian physicians or by young medical

officers without practical experience of service conditions, is the failure to distinguish between the candidate's expectation of life and legitimate grounds for the expectation that he will be a useful member of the military body he seeks to enter. It is not enough to be able to say that in all probability a candidate will live for 20 years. The examiner must have a reasonable assurance that the candidate will be able to give from 8 to 12 years of satisfactory service in return for the Government's outlay in feeding, clothing, and training him.

A candidate for enlistment will often say with perfect truth of some disability which the examining surgeon has discovered: "It never bothered me." The vital consideration then is, will this disability bother him under the peculiar conditions which will surround him in the service, conditions entirely different from any he has previously known. It not infrequently happens that a disability accounted trifling by a man working in a store or factory assumes considerable real or imagined importance after enlistment. When an enlisted man has to be carried on the sick list for purposes of observation, when frequent examinations and consultations are necessary in his case, when the defect which "never bothered him" gradually leads to disinclination to work or dissatisfaction with the duty assigned him, such a man becomes a poor asset to the service, and, if he loudly and persistently points to his defect and maintains that it *does* bother him now, his ultimate discharge from the service is almost a matter of certainty. The time and energy devoted to training this man has been wasted just as truly as if he had been a sufferer from a physical defect which should have caused his rejection at the recruiting office.

The expert civilian physician constantly assures candidates for enlistment and their medical examiners that this or that physical defect is merely functional and so negligible, but medical officers of experience know only too well how often these negligible defects utterly invalidate a man's eventual usefulness in the service of his country. Every medical officer who has served at sea can testify to the frequency with which the medical survey and discharge of a man leads to requests for discharge from a large number of others; from men who have become disgruntled or dissatisfied when the glamour of sailoring has worn off. The effect of a medical survey and discharge is peculiarly demoralizing when it is occasioned by some defect which was assumed to be trifling at the time of enlistment.

In the majority of cases an experience of service conditions has demonstrated that while there is a vast difference between functional and organic lesions (of the heart for example), so far as concerns expectation of life, the *undesirability* of a candidate for enlistment

is about the same whether his lesion be organic or functional. The subject of a functional cardiac disorder is not apt to be a cheerful, indefatigable worker, and, whenever he wishes to avoid any arduous or disagreeable effort, his slight disability provides him with a way of escape. Such a man creates around himself an atmosphere of sympathy that will often seriously embarrass the solitary medical officer embarked with him, no longer backed up by the testimony of eminent specialists and open to criticism on many counts.

WHERE THE PSYCHIATRIST FAILS.

If the remarkable and astounding activities, the profound agitation going on in many branches of business, if the countless enterprises recently undertaken in this country were all in one place and could be expressed by word of mouth, there would be a pandemonium of sound as disconcerting as the drum fire of the war zone. Happily, a great deal of the disturbance becomes relatively harmless by being committed to the written or printed page and soon flows silently to the waste-paper basket. Washington is the storm center of this fever of reform and change. Suggestions, requests, orders, threats, ultimatums, hints, prayers, tears, pelt the Government like hailstones.

The trifling matter of reforming human nature and stopping illicit sexual indulgence, the extermination of venereal disease, the liquor question, the tuberculosis problem, the matter of tobacco and drug addictions are but a few of the questions more or less connected with medicine for which solutions have been found by well-meaning and even well-informed persons, willing, without profit or renown, to bequeath their ideas to the Government.

One of the earliest subjects to receive attention was the enlistment of the mentally unfit. The Medical Department of the Navy has been engaged on this problem for some years, and, even before our active participation in the present war, social and industrial workers, philanthropists, psychopaths, and those educators particularly concerned with juvenile defectives and delinquents began to call attention to the importance of keeping the mental defectives out of the ranks of our fighting forces.

Divested of form and ceremony the offers of service said in essence:

Give me the task of keeping out the unfit. I will select a staff of assistants from among those trained by me, conforming to my views, and personally known to me. I will rid you of these pests with the thoroughness of the cockroach king who will not tell what his remedy is but comes aboard and guarantees to stamp out every form of vermin.

It was recognized that there was great danger of taking in unawares weaklings unable to endure the asperities of a campaign and that the menace of the unfit was more to be dreaded than ever under the emotional stress of war time. And so an effort has been made to supply our training camps with a sufficient force of psychiatrists to examine the recruits with systematic care. The results have been satisfactory to the extent that a large number of men have been discharged who were presumably not possessed of the stable mental balance necessary for war endurance, and out of the number discovered by our 30 odd psychiatrists doubtless a certain per cent would not have been discovered so early and therefore been removed so promptly from the service.

This is good as far as it goes, but there is a problem of wider scope whose solution would bring large returns to the Government. Whether the solution has been seriously attempted is not known, but no answers have been sent in as yet. Now that the expert examiners referred to have had a reasonable opportunity to become familiar with the conditions of naval life, it must be clear to them that there is no permanent demand for any considerable number of psychiatrists in the Medical Department on a peace footing. This statement is no disparagement to them, for, as a matter of fact, the recruiting office and training station examinations for the detection of mental defectives hardly offer scope for a life work. While the younger specialists in this branch might be glad to put in a year or so employed in such routine work, the ambitious and able alienist will in time find this field monotonous and restricted. When the war ends and the country releases these experts from the patriotic duty of service with the colors, the Medical Corps of the Navy should be in a position to continue the active protective efforts now employed. We ask, therefore, of the psychiatrists associated with us the elaboration of a brief, comprehensive method of procedure capable of being used by every medical officer for detecting the defectives. That examinations conducted by the general practitioners of the Navy will be productive of results as satisfactory as those obtained by specialists we do not claim, but, once a proper routine method of testing is agreed upon, our recruiting surgeons can certainly perfect themselves in its use, and the knowledge they acquire in this way will have permanent value for them.

If, on the other hand, the psychiatrist should not be able to settle upon a practical method capable of successful employment by some one other than an expert, he fails to meet the demand laid on him.

The best things in science, in art, in medicine are for the many, and the practical helper has always said, "I will show you how to do this," which is considerably better than saying, "That is my secret. I am the only person who can successfully operate the device."

Fig. 1.—Dislocation of left semilunar bone and normal right wrist.

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CLINICAL NOTES.

DISLOCATION OF CARPAL SEMILUNAR BONE.

By R. E. Hoyt, Commander, M. C., United States Navy.

Case, J. G., private Marine, 58 years old, 22 years' service in Cavalry and Marine Corps, and famous for a prolonged alcoholic record, fell into an excavation while on liberty, striking on his face and outstretched left hand, which, according to the very hazy recollection of the patent, was bent forcibly backward.

On admission to the United States Naval Hospital, Puget Sound, the wrist was found considerably swollen, very tender to the touch, and exceedingly painful on attempted motion, which was limited. Fluoroscopic examination, confined chiefly to the lower ends of the radius and ulna, failed to show any fracture.

Two days later X-ray plates showing antero-posterior and lateral views of the wrist were taken and from these, especially from the lateral view (fig. 1), the characteristic picture of dislocation of the semilunar bone was obtained.

This case emphasizes the importance of very careful X-ray examination of all lesions involving the wrist joint. Disregarding the common Colle's fracture, which, as a rule, is diagnosed without any special difficulty and the rare condition of dislocation of the wrist as a whole, most of the less definite abnormalities about the wrist following injuries or falls, and having as their signs and symptoms, pain, swelling, and limitation of motion, are classed under the head of "sprains." The X-ray has been most valuable in these obscure cases and has enabled us to correct the indefinite blanket diagnosis of "sprain" and to realize the comparative frequency of carpal injuries.

The three methods of treating a dislocated semilunar are: First, forcible reduction by manipulation under an anæsthetic; second, reduction by manipulation through an anterior incision; third, in case these methods are unsuccessful, removal of the bone, through an anterior incision. Owing to the swelling of surrounding tissues and encroachment of the other carpal bones on the space formally occupied by the semilunar, it becomes an exceedingly difficult matter to replace the latter bone even after cutting down upon it. In cases of

complete dislocation, such as shown in this case, the reposition is practically impossible without extensive injury to the wrist, which is not justifiable, considering the fact that a good functional result usually follows the removal of the bone.

After unsuccessful attempts at reposition by the first two methods mentioned, the bone was removed through an anterior incision. Recovery was uneventful and a good functional result obtained. A picture was taken several months after the patient had been restored to duty, and figure 2 shows the condition of the wrist at that time.

ANEURYSM AND RUPTURE OF THE LEFT POSTERIOR CEREBRAL ARTERY.

By J. J. A. McMULLIN, Lieutenant Commander, M. C., United States Navy.

This case is reported because it has points of medical, surgical, and medico-legal interest.

J. R. O., a carpenter in the navy yard, Cavite, P. I., 54 years of age, entered the hospital at 2.30 p. m., May 11, 1918, in a deeply comatose condition. According to the history the patient was much addicted to native gin; had a remarkable tolerance for alcohol; was apparently never much affected by his imbibitions. It was also learned that 12 hours prior to admission he stumbled to the floor while walking about in the dark, and that he struck his head and immediately became unconscious. He was seen by a physician several hours later and pronounced under the influence of alcohol.

Physical examination.—Large, well-developed man, presenting marks of external violence about head. The palpebral tissues of both eyes swollen and ecchymotic; lips cut and swollen; ecchymosis, hematoma, and swelling in left parietal region.

Lungs: Coarse bubbling râles throughout both lungs. No dullness.

Heart sounds: Weak; obscured by stertorous breathing and râles.

Blood pressure: systolic, 125; diastolic, 85.

Liver: No enlargement.

Spleen: Palpable.

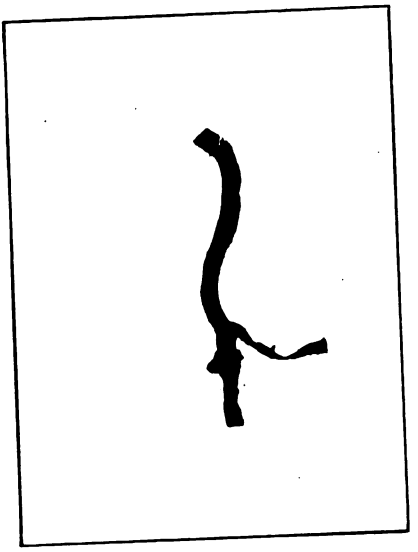
Roentgenogram of skull did not show fracture. No motor paralysis could be made out. Patient moved arms and legs and there was no evidence of facial paralysis.

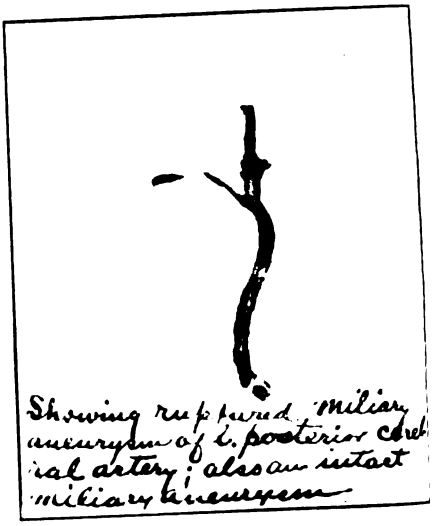
Pupils regular, equal, contracted, and fixed. Biceps cremasteric and patellar reflexes absent. Babinski well marked on both sides.

Lumbar puncture showed fluid under pressure; 40 mils of homogeneously bloody fluid were withdrawn, after which patient breathed more quietly and less frequently.

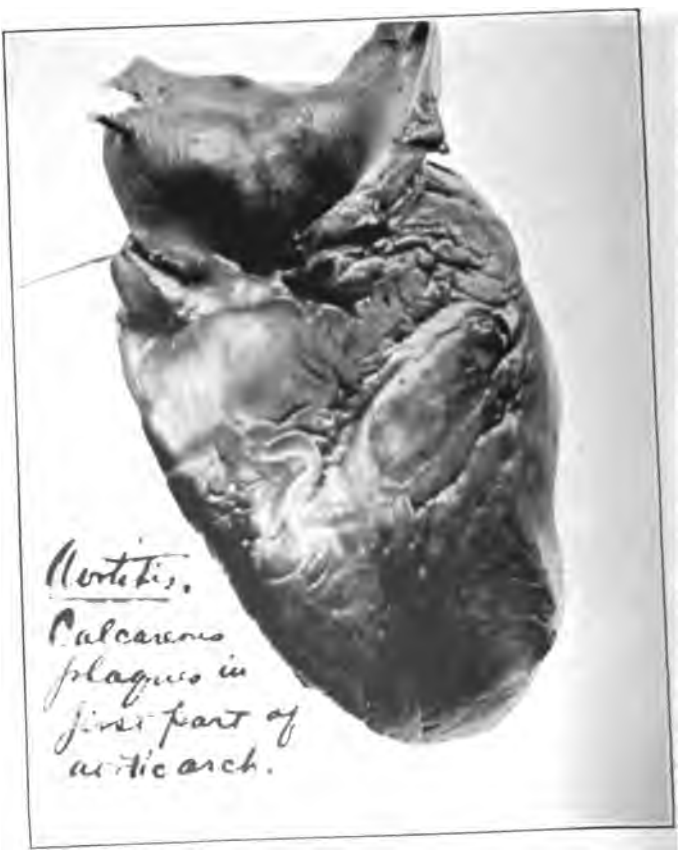
Specimen of urine obtained by catheterization showed heavy trace of albumin, no casts, and many pus cells.

Fig. 2.—Left wrist several months after operation.





Ruptured left posterior cerebral artery.



The question of diagnosis in this case was complicated, as it frequently is, by factors which pointed to alcholism, uremia, and intracranial pressure from fracture, rupture of a meningeal vessel, or cerebral hemorrhage.

In this case there was a general suspicion of "foul play," and the marks of external violence about the head seemed to bear out the suspicion. Did the patient have a fracture of the skull? Did he have meningeal hemorrhage without fracture? Did he have cerebral hemorrhage? Or did he have none of these things and the coma result from uremia?

The evidence in favor of intra-cranial hemorrhage led us to believe that the signs and symptoms were due mainly to that cause. The probability of kidney damage in a gin drinker 54 years old seemed great. But the absence of casts in the urine, the low blood pressure, the absence of urinous odor on the patient's breath, and the history of the onset of the attack inclined us to the opinion that the coma was complicated slightly, if at all, by uremia.

Although there were no localizing symptoms, a decompression operation seemed indicated, considering the evidence of external violence and intra-cranial hemorrhage. The decompression was done in the left parietal region over the site of injury. No anæsthetic was necessary. The skull was trephined with Hudson's drill and the opening enlarged with rongeur forceps. The site of the hemorrhage could not be located. A cigarette drain was inserted and the patient returned to bed as rapidly as possible. The pulse gradually became weaker and more rapid and respiration more shallow, and the patient quietly passed out six hours later.

Autopsy findings.—Heart: No gross lesions. Aortitis, calcareous plaques in first part of arch of aorta.

Lungs: Passive congestion.

Liver: No gross lesions.

Kidneys: Apparently normal. Microscopic section showed cloudy swelling and passive congestion.

Stomach and intestines: Nothing except adhesions between great omentum and colon. Appendix showed evidence of past inflammation with many adhesions.

Spleen: Enlarged; extended 3 inches below costal border.

Bladder: Chronic inflammation. Contained 20 mils purulent urine, also three small calculi.

Prostate: Not enlarged. Normal in appearance.

Brain: Showed evidence of extensive hemorrhage under arachnoid. Firm clot investing medulla and pons and extending over the surface of the cerebellum. Fluid in ventricles bloody.

The left posterior cerebral artery showed a ruptured miliary aneurysm and close thereto an intact miliary aneurysm. These are shown in the accompanying illustration.

The elimination of uremia and alcoholism was correct and the diagnosis of intra-cranial hemorrhage was correct. Localizing symptoms being absent, the location of the bleeding vessel was a matter of speculation, but decompression was justifiable since we had evidence of head injury and intra-cranial hemorrhage.

The cerebro-spinal fluid withdrawn before, but examined after, death gave a completely positive Nogouchi reaction. This completed the picture of syphilitic aortitis, arterio-sclerosis, and aneurysm and rupture of the posterior cerebral artery. The injury to the head was incidental and probably did not cause the rupture of the artery, but causes leading up to the head injury raised the blood pressure sufficiently to rupture the damaged wall of the vessel.

It is not likely that both eyes, upper and lower lips, and the left parietal region would be injured by a man stumbling and falling to the floor. The chances are that the patient was engaged in an affray of some sort and that the history given was willfully misleading. In this instance the authorities inclined to this opinion and arrested a man with whom the patient was alleged to have fought. Subsequent investigation showed this surmise to be correct.

It is readily conceivable that a conviction for murder or manslaughter might be made in a case with circumstances similar to this provided syphilis was not sought for, and the aneurysm and rupture of the artery overlooked.

REPORT OF A CASE OF CAVERNOUS HAEMANGIOMA.

By C. W. Smith, Lieutenant Commander, M. C., United States Navy.

Virchow has observed but one pure case of cavernous haemangioma. The following case of cavernous haemangioma of the supraclavicular region would therefore seem sufficiently interesting and unusual to be made the subject of a report and placed on record.

J. R. R., SC–3, age 23 years, enlisted in the United States Navy May 24, 1917, and has been admitted as a meningococcus carrier and with mumps, but there is no record of anyone having observed a well marked tumor in the left supraclavicular region. This young man first came under observation when he appeared before the commanding officer for discharge from the service, at which time the commanding officer noticed a swelling in the neck and referred him to the medical officer for examination. Except for the ordinary diseases of childhood he has never been ill. His family and personal history are negative. He states that in 1911 he received a slight injury in the region of the tumor and later in the same year was burned

in this region by the discharge of a Roman candle. At about this time he first noticed a small, soft swelling, which has intermittently been larger and smaller up to the present time, but he believes that the swelling is considerably larger now than when he first noticed it. He states that the wearing of a collar causes him discomfort, and that when he exercises the tumor becomes tense and causes him slight discomfort and pain. Since he has been in the Navy he has performed all the duties of his rating without any discomfort, except a "tight" feeling and slight pain when required to make any unusual physical effort.

Examination of the patient reveals a soft, irregularly shaped tumor, which, when distended, extends from the sternal head of the sternomastoid muscle to a point 1½ inches from the anterior border of the trapezius, and 1¾ inches above the clavicle. The tumor projects in front of the sternomastoid muscle and also comes to the surface between the clavicular and sternal heads of the muscle. (See fig. 1.) When the patient is relaxed and sitting quietly at rest the tumor is hardly visible. (See fig. 2.) On palpation there are irregular projections similar in nature to large varicosities, but no pulsations can be seen or felt. On percussion a flat note is elicited. Auscultation reveals no bruit or breath sounds. The overlying skin is not discolored and not adherent to the deeper tissues. The most striking symptom was the enormous increase in size produced when the chest and neck muscles were contracted and expiratory effort made after full inspiration with the mouth and nose closed, in contrast with almost complete disappearance of the tumor while the patient was sitting quietly at rest. (See figs. 1 and 2.)

The diagnosis of intermuscular cavernous haemangioma was confirmed by Surgeon J. Chalmers DaCosta, United States Naval Reserve Force, who made a careful examination of this case. He stated that in his opion the tumor probably extended into the superior mediastinum and its removal therefore would involve great surgical risk. He believes that the only indications for operation would be imminent rupture or severe pressure symptoms. Dr. Francis T. Stewart, Jefferson Medical College, Philadelphia, agreed with Surgeon DaCosta as to the diagnosis and surgical prognosis.

Radiographic examination was made by Passed Assistant Surgeon G. M. Neuberger, United States Naval Reserve Force, League Island Naval Hospital, Philadelphia, and his interpretation of the radiograph is here quoted: "Dense shadow in left apex extending down lower border first rib. Heart unusually large and displaced into right chest." These findings would tend to confirm the opinion that the growth extends within the chest cavity.

Cavernous hæmangioma is a vascular tumor consisting of large intercommunicating blood spaces lined with endothelium. Connect-

ing tissue framework varies in quantity and in this case there seems to be very little. Blood circulates through the tumor and is supplied in most cases by the venous system. The tumor occurs in the skin, subcutaneous tissues, intermuscular tissues, bones, and viscera. It is most commonly found in the liver. The etiology is obscure. Some authorities claim that trauma has an important bearing, others that the condition is almost always congenital and that the tumor may enlarge later in life. Cavernous hæmangioma of the neck should be distinguished from the following conditions: Aerocele, hernia of the lung, vascular goiter, fibroma, lipoma, cold abscess, and aneurysm. In this case the flat note on percussion, the absence of breath sounds or bruit, the rapid distension and relaxation of the tumor, and the sensation imparted on palpation as of an accumulation of fluid under slight tension, made the diagnosis clear. Sutter states that there are on record 51 cases of cavernous and telangiectatic angiomata, and only 11 of these are of the pure cavernous type. Their distribution in the body is as follows: Lower extremity, 19; upper extremity, 15; back and neck, 12; abdomen, 3; breast, 1; head, 1. J. B. Carnett reports two cases of cervical subcutaneous cavernous hæmangioma. He states that these tumors were rather easily removed after a long dissection with no unusual loss of blood as they were situated high in the neck and surgical approach was comparatively easy. The diagnosis in these cases was confirmed by laboratory examination.

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REPORT OF A CASE OF ACUTE BILATERAL DACRYOADENITIS.

By J. V. Connole, Lieutenant (J. G.), M. C., United States Navy.

Dacryoadenitis, or inflammation of the lacrimal gland, may be acute or chronic; unilateral or bilateral; suppurative or nonsuppurative. Weeks, in considering all forms of dacryoadenitis, states that it occurs once in ten thousand eye cases. Acute bilateral inflammation of the lacrimal gland is very rare and has for its chief symptom the disfigurement of the face, occasioned by the swelling of the lids. Resolution usually occurs after a short mild course and the function of the glands is not altered.

Rider, in 1872, reported a case of acute bilateral inflammation of the lacrimal glands, occurring in epidemic parotitis, in which metas-

Bilateral dacryoadenitis.

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tasis to the testicle took place as the parotid swelling disappeared. The swelling of the lacrimal glands was observed as the testicular swelling subsided. A similar case has been observed by V. Schroeder.[3]

Gordon Norrie,[3] in 1889, observed in a girl of 11 years a bilateral swelling of the lacrimal glands which was followed two days later by epidemic parotitis. Sendral[4] reports a similar case. In 1890, Hirschberg[5] described two cases of bilateral subacute, nonsuppurative dacryoadenitis, which he called "mumps of the lacrimal glands" on account of its analogy to bilateral parotitis. Giani,[6] in 1907, described a case of acute bilateral dacryoadenitis occurring during the course of acute urethritis.

J. G. R., S-2, was admitted to the United States Naval Hospital, League Island, Pa., complaining that for the past three days he had had dull, pounding headache, though not suffering enough to prevent sleep. Anorexia and pains in limbs and trunk were present. About two days ago, the eyelids began to swell and become red until the appearance was that shown in accompanying illustration. Family and personal history have no bearing on the case. No history of exposure to any acute infection or mumps. Venereal infection denied. Physical examination as follows:

Well-nourished white male of 23 years. Head and neck negative except for the condition of eyes. Heart and lungs negative. Abdomen presents scar of appendectomy in lower right quadrant. Upper and lower limbs negative. Genitals negative and present no evidence of venereal disease. Glandular system negative except the bilateral swelling of lacrimal glands. Examination of eyes: Vision right eye 18/20; vision left eye 16/20, upper and lower lids of each side markedly swollen and slightly red; mechanical ptosis to the extent of covering upper half of each pupil. Palpation of temporal side of each upper lid reveals enlarged lacrimal glands, which are not tender. Lacrimal secretion not increased; conjunctiva of fornices slightly injected; chemosis of temporal quarter of bulbar conjunctivæ of each side. Examination of anterior segments, media, and eye grounds of both eyes negative.

Temperature on admission 100.6 F., which gradually subsided until normal was reached in four days. The swelling of the lids and glands and the redness of lids gradually disappeared in five days. Function of the glands is not altered. Blood examination, including Wassermann negative. Urine examination negative. Smears from eyes showed few Gram positive diplococci. Cultures showed scanty growth of pneumococci. The features of interest in this case are the unusual occurrence of the condition and the question of etiology. In view of the fact that although no history of exposure was obtained, epidemic parotitis was prevalent in this locality at the time

and since the literature has shown that acute bilateral inflammation of the lacrimal glands occurs as the complication of mumps or preceding the swelling of the parotids, there is a possibility that the causative agent of the latter may be the etiologic factor in this case.

On the other hand, the finding of pneumococci presents the possibility of its being the cause. This is given additional weight by the fact that several cases of pneumococcic conjunctivitis were treated at about this time at this hospital.

Treatment was eliminative combined with the employment of warm applications of normal salt solution.

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PARALYSIS OF MUSCULOSPIRAL NERVE FROM PRESSURE OF RIFLE STRAP WHILE FIRING.

By J. C Adams, Lieutenant, M. C., United States Navy.

While traumatic paralysis of the musculospiral nerve is by no means an uncommon condition, yet the following case is reported because of the unusual way in which it was caused and the ease with which a condition of this kind might occur again under the same circumstances.

L——, J. R., private, United States Marine Corps, age 21, was admitted to the sick list June 5, 1918, complaining of loss of sensation and function of the left forearm. According to his own statement, disability commenced while firing a course on the range the previous afternoon and eventually forced him to cease firing. Examination of the arm showed a complete loss of sensation over the area supplied by the superficial branch (Radial N.), while wrist drop, inability to extend the wrist and fairly complete paralysis of the extensors of the hand showed the involvement of the muscular or deep branch (Posterior Interosseous N.). By the use of massage, strychnine and mild counterirritation the patient was returned to duty in four days.

Showing position of rifle strap on the arm.

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The pictures show fairly well the rifle strap in the firing position and the manner in which the greater part of the pressure from the strap is exerted over the musculorspiral nerve as it curves round the humerus.

CUTANEOUS DIPHTHERIA OF THE FOOT.

By J. J. KEEGAN, Lieutenant (J. G.), M. C., United States Navy.

An unusual case of cutaneous diphtheria was recently observed at the United States Naval Hospital, Chelsea, Mass. The patient was received for treatment of a gangrenous ulcer, 12 centimeters long and 7 centimeters wide, occurring over the external malleolus of the right foot. The ulcerated surface was covered with a grayish-white membrane and surrounded by an elevated indurated border. The posterior and lateral surface of the leg, extending as high as the knee, showed marked induration, redness, and tenderness.

Smears made from the covering membrane or exudate showed predominating numbers of gram positive bacilli with typical morphology and staining qualities of diphtheria bacilli with methylene blue and Neisser's stains. There were also considerable numbers of Gram positive cocci and diplococci, which proved on culture to be staphylococci and streptococci. Cultures on Loeffler's blood serum gave a very positive growth of diphtheria bacilli of typical morphology and staining qualities.

A slight huskiness of the patient's voice was noted, although no special soreness of the throat was complained of. The tonsils and posterior pharyngeal wall were dark red and rather rough. There was no membrane over the tonsils but a few areas of grayish-white fibrinous exudate were noted on the posterior pharyngeal wall. Cultures from these on Loeffler's blood serum gave a pure growth of diphtheria bacilli.

The preadmission history of the case records a small pressure sore from a tight shoe, about seven days ago, which spread very rapidly, as a large bleb and was opened three days before admission and found to contain a large amount of rather thick grayish-yellow pus. This was treated with sterile dressings, but resulted in a large superficial slough, increase in size of the ulcer, and marked inflammatory extension into the surrounding tissue. The patient gave no history of special throat symptoms. The huskiness of the voice had been present two days before admission.

The clinical history was negative. The temperature was about 99° and the pulse 80 to 90 for a few days. The ulcer was treated first with a dressing moistened with diphtheria antitoxin and 9,000

units of diphtheria antitoxin were injected intramuscularly. Beef serum dressings were applied daily thereafter. The surrounding inflammation subsided rapidly and healthy granulation tissue filled the floor of the ulcer. Twenty-one days after admission the ulcer had reduced in size from 12 cms. by 7 cms. to 8 cms. by 5 cms. Throat cultures were positive for diphtheria bacilli nine days after admission and ulcer cultures positive only two days.

The literature records many instances of cutaneous infection with the diphtheria bacillus, which, however, are rare when the great number of cases of diphtheria are considered. These are chiefly cases of extension from the oral mucosa to the face, to the surface of wounds, or to the female genitals. Authentic cases of cutaneous diphtheria without evidence of clinical diphtheria are very rare. It is necessary to prove these cases by guinea-pig inoculation of cultures of the organism to demonstrate its virulence and identity as a true diphtheria bacillus.

The present case is interpreted as a probable primary pharyngeal infection with the diphtheria bacillus, with mild symptoms, and the transmission of this to the skin abrasion on the foot, resulting in extensive abscess and ulcer. There was undoubtedly a secondary streptococcus infection of the ulcerated surface, causing in large part the wide surrounding erysipelatous inflammation.

The cases similar to the present reported case, with abscess, gangrenous ulceration, and surrounding erysipelatous inflammation, are not numerous. Williams (Jour. Med. Res., 1902, viii, 83) and Abel (Cblt. f. Bakt., 1894, xvi, 455), isolated virulent diphtheria bacilli from a lesion on a finger of a patient with clinical diphtheria. Todd (The Lancet, London, 1898, i, 458) briefly records the finding of diphtheria bacilli in two pustules of the foot, complicating cases of diphtheria. Heelis (Brit. Med. Jour., i, 556) discovered virulent diphtheria bacilli in two cases of ulceration of the foot, thought to be due to chilblains. Leary (Med. Surg. Rep., Boston City Hosp., 1896, 129) found a pure culture of virulent diphtheria bacilli in an abscess which developed about a hair follicle two days after an autopsy on a case of diphtheria. The abscess remained local.

LARGE CALCULUS REMOVED FROM COMMON DUCT.

By R. G. LeConte, Lieutenant Commander, M. C., United States Navy.

R. B. L., Filipino, cabin steward, age 26 years, admitted March 26, 1918, to the medical service. When he entered the hospital, he complained of right-sided abdominal pain which, according to his statement, had begun four days previously, or on March 22. His pain was knifelike and, at times, radiated to back and right shoulder and his abdomen showed the scar of a rectus incision beginning in

the right hypochondrium, cholecystostomy having been performed previously.

On March 28, fluoroscopic and skiagraphic examinations showed a "projection below margin of liver at middle anterior edge." On the same day a gastric analysis showed that there was, after a "fasting stomach, small quantity of subacid content. No obstruction. Sixty-minute digesting stomach, subacid catarrhal gastritis, mucus greatly increased, but no bleeding."

March 29, patient had definite gall-stone colic, jaundice of scleræ and 10,350 leucocyte count. March 30, leucocyte count was 10,000. On March 31 two trifaceted gall stones were recovered in the stool. On April 2 two more faceted stones were seen in feces.

A conference was held and, although surgical interference was decided upon, it was deemed advisable to wait for quiescence of acute inflammatory symptoms. Transferred to surgical service.

On April 9, at 9.30 a. m. the patient was operated upon under chloroform-ether anæsthesia. Incision just to right of median line, 5 inches long, above umbilicus. At its lower end incision was prolonged transversely across whole body of rectus. Omental adhesions surrounded gall bladder and lower surface of liver. Omentum adherent to anterior abdominal wall. These adhesions were broken up and the omental hemorrhage controlled by catgut ligatures. Anterior wall of stomach near pylorus also adherent in mass. While separating these adhesions the gall bladder was torn from anterior abdominal wall. It was large, thick-walled, and filled with currant-jelly clot without visible bile. The head of the pancreas was hard and common duct greatly dilated; on opening the latter it was found filled with currant-jelly clot. A large faceted stone, perhaps 1¼ inches in its diameter, was removed from the common duct, together with several smaller stones. The ampulla of Vater was free from stones. The hepatic duct, although greatly dilated, seemed empty. After emptying the gall bladder and common duct of clots, a thick, altered bile with sandy flakes appeared. A large drainage tube was fastened in common duct with a catgut suture and gall bladder drained in a similar way. Peritoneal cavity drained with cigarette drain and a split rubber tube.

Returned from operation at 10.45 a. m. in good condition. Patient redressed at 4 p. m. when gall bladder and common duct were connected with two bottles by means of rubber tubes. Patient drained 120 c. c. of bile during first 12 hours and thereafter quite freely. On April 11, rubber tube removed from peritoneal cavity. April 12, cigarette drain removed. Rubber tubes, draining gall bladder and common duct, removed April 14.

CIRCUMCISION IN THE PRESENCE OF CHANCROIDS.

By J. S. Van Winkle, Lieutenant (J. G.), M. C., United States Navy.

Surgical operation on the penis in the presence of chancroidal ulceration is generally conceded to be inadvisable. Operative treatment in these cases has been limited either to simple cauterization, to the incisional relief of a complicating paraphimosis, or to dorsal splitting of the prepuce in cases of phimosis for the purpose of exposing and treating concealed lesions. Circumcision, as a primary operative procedure in chancroidal cases, has usually resulted in generalized infection of the line of incision with spreading ulceration and prolonged convalescence, and often with marked ultimate deformity of the penis. In the less virulent cases of penile chancroids without complications, local treatment should be adhered to since in these mild cases the operation of circumcision neither hastens the cure nor contributes to the patient's safety or comfort. In the virulent cases with serpigenous forms of ulceration, often complicated by marked edema of the prepuce and phimosis, we have lately substituted primary circumcision for the usual procedure of dorsal or lateral splits. We have found that primary circumcision can be performed with safety in these cases and with the full expectation of primary union of the wound in practically all instances except where the line of incision actually traverses the ulcerated areas. Even in this latter group there is a marked reduction in the convalescence time over the old methods of treatment if the technique described below is rigidly followed.

Technique.—Conduction anesthesia is produced in the dorsal nerves of the penis by injections of cocaine solution (½ per cent). A circular skin incision is then made just back of the coronal line, and the preputial skin flap thus outlined is dissected forward until the reflected mucosal layer covering the glans of the penis is well exposed. Thus far the dissection has been made through healthy tissue, but in order to prevent future contamination the denuded area is sprayed with dichloramin-T solution (7 per cent). A small vertical slit is now made in the reflected layer of the prepuce near the coronal margin, and through this opening the preputial sac is thoroughly irrigated with the dichloramin solution. With a pair of curved scissors introduced through the small slit in the mucosa, the latter is excised in the usual manner, thus permitting the removal en bloc of the prepuce from behind forward. This dissection is made entirely outside of the ulcerated area except in cases where the coronal sulcus is involved in the destructive process. The same technique is followed in the latter group of cases with the addition of thorough cauterization of the remaining areas of ulceration.

Persistence of the thyroglossal duct.

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Results.—We have followed this technique since January 1, 1918, in 28 cases. Of these, 24 (86 per cent) healed primarily; delayed primary healing occurred in 3 cases (10 per cent), while complete breaking down of the wound occurred in only 1 case (less than 4 per cent).

PERSISTENCE OF THE THYROGLOSSAL DUCT.

By B. D. PARISH, Lieutenant, M. C., United States Navy.

Congenital cervical fistulæ require radical treatment when they give rise to much inflammation or to cystic tumors or for cosmetic effect. Cervical fistulæ may be lateral or median; when lateral they are known as branchial fistulæ due to failure of closure of one of the branchial clefts; when median the fistula is the result of the non-obliteration of the thyroglossal duct.

Congenital fistulæ do not always cause symptoms and may not be discovered until adult life or until some distention and irritation by mucuous-hyaline or muco-purulent discharge has called attention to them. The term "duct" is rather misleading as the thyroglossal duct has no such function, being merely the unobliterated canal lined with apithelium through which the thyroid sinks from the base of the tongue to its final resting place in embryo.

From the dissections of Moragni, and later Minot, it appears that the thyroid sinks from its original position on the dorsum of the tongue, normally obliterating its tract. In some mammals, Woelfler, Meuron and Van Bemmelen found that the thyroid sometimes sank as low as the arch of the aorta, but never below the top of the sternum. Unobliterated portions of the descending canal with a lining of epithelium form congenital thyroglossal tracts.

This congenital malformation is better appreciated if the manner of development of the thyroid gland is clearly understood. In early embryonic life, the gland consists of three parts, two of which are situated laterally and derived from endodermic linings of the fourth visceral furrows on each side, while the third one, which forms the central portion of the gland, is an outgrowth from the ventral wall of the pharynx, about the position of the second visceral arch, which outgrowth, known as the thyroglossal duct, or canal of His, grows downward through the hyoid bone and joins the lateral portions. Normally this outgrowth of glandular tissue should lose its connection with the pharynx, and the connecting band become obliterated by the eighth week of fetal life, its origin being represented in the normal individual by the foramen caecum at the base of the tongue.

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If glandular tissue persists in the whole or any portion of the duct course, we have in the remaining tissue a nucleus for the development of a pathological condition which may assume one of several forms. These forms are solid tumors of thyroid tissue at the base of the tongue (1), cysts or solid tumors of thyroid tissue in the hyoid bone, or between it and the tongue (2), or below the hyoid bone, between it and the thyroid gland. Sometimes the whole duct persists as a canal lined with epithelium, although it is said usually to be interrupted at the thyro-hyoid ligament (3).

The following case is interesting because of the misleading history of the presence of a foreign body and the rather rare condition of a persistent thyroglossal duct.

W. C. J., seaman, second class, age 18 years, was admitted to the Naval Hospital, League Island, Pa., November 28, 1917, with the following history: For about one year he had pain and a discharging sinus just above the suprasternal notch in the midline of the neck. He was of the opinion that there must still be a foreign body somewhere in his neck, as about three years ago a piece of metal about the size of a pin was expressed from the neck at the opening of the sinus. With this history it was thought best to study the case first by means of the X-ray. These plates were taken by Passed Assistant Surgeon Neuberger, United States Naval Reserve Force, one to determine the presence of a foreign body, one with a segmented opaque probe inserted, and one after injection with bismuth paste. No foreign body being found, the duct was then dissected out under ether anaesthesia. It extended from just about the suprasternal notch to the hyoid bone, along the anterior surface of the trachea, where it ended in a broad fan-like aponeurosis. No extension above the hyoid could be found or outlet at the base of the tongue. The wound was closed by metal clamps, and healed by first intention. No recurrence of the condition has been reported up to the present time.

It would appear that the history of a pin being extracted was true, the probability being that it was placed in the duct during childhood and forgotten till it expelled itself.

Any swelling or sinus of more than transient duration situated in the median line of the neck, or in the floor of the mouth or at the base of the tongue should be carefully examined to exclude the presence of a thyroglossal duct.

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Persistence of the thyroglossal duct.

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RUPTURE OF POPLITEAL ANEURYSM FOLLOWING THE ADMINISTRATION OF SALVARSAN.

By F. J. Dever, Lieutenant, M. C., and R. S. Boles, Lieutenant, M. C., United States Navy.

The following case is reported in order to illustrate the harmful result that may follow the administration of the arsphenamins in syphilis of the cardio-vascular system.

R. H. A., fireman second class, 47 years old, was admitted to the United States Naval Hospital, League Island, Pa., November 30, 1917. He complained of a small mass of four weeks' duration in the right popliteal space, causing little discomfort aside from occasional aching following unusual exertion. From the time it was first noticed it did not increase in size to any appreciable extent. The patient believed the mass resulted from riding a slice bar. He has been a fireman for four months, prior to which time he was a bookkeeper. While a fireman he almost constantly rode the slice bar.

The patient states he had a chancre 25 years ago. He was under treatment for same for two and a half years, receiving mercury and iodides. Secondary symptoms were never observed.

Family history was negative. He is unmarried and has never indulged excessively in alcohol or tobacco.

On admission physical examination revealed normal station and gait, except for slight limping of right leg. Pupils were equal and regular and reacted to light and accommodation. No thyroid enlargement. Pulse of increased tension; rhythm regular; normal rate. Vessels hardened. The area of cardiac dullness was normal. There was slight accentuation of the aortic second sound and no audible murmurs. Lungs were negative. Liver and spleen were not enlarged. Knee jerks normal. No abnormalities detected in upper extremities.

There was a tender, pulsating, expansile mass about the size of a hen's egg in the right popliteal space and over this mass could be heard a distinct bruit. A pulse of equal volume was felt over either dorsalis pedis. There was an appreciable difference in the size of the two legs, the right calf measuring 1 inch larger than the left. The right foot was slightly swollen. The circumference of the left knee was 14¼ inches and of the right knee 15⅛ inches. There was no difference in the surface temperature of the two legs.

Blood examination revealed 4+ Wassermann and normal coagulation time. Systolic blood pressure was 140 mm., and diastolic 85 mm. Urine was negative.

The patient was confined to bed. Ten grains of potassium iodide were administered t. i. d. and mercurial treatment by inunction was given in the usual manner. Continuous digital pressure was ex-

erted over the right femoral artery for 48 hours, at the end of which time the pulsation over the aneurysm was distinctly less violent, although the size remained unchanged. Ten days after admission 0.4 gm. salvarsan in 100 cc. solution was given intravenously. The drug was properly dissolved and neutralized and the solution was free from sediment. Following the injection the systolic blood pressure was 5 mm. higher and the diastolic blood pressure 5 mm. lower than immediately before. There was no constitutional reaction following the administration of the drug.

Within 48 hours after the injection, the patient complained of severe pain over the aneurysm which became so intense at the end of 96 hours that morphine was required. The mass was observed to be distinctly larger, practically filling the popliteal space. During the next 10 days the mass became progressively larger and more painful and extended about 4 inches down the calf of the leg. The edge was not clearly defined. The circumference of the right knee at this time was 17¼ inches and the left knee 14¼ inches. Because of the rapid extension of the mass and the great increase of pain with total disability, the leg was amputated at the junction of the upper and middle thirds of the thigh. This was followed by an uneventful convalescence.

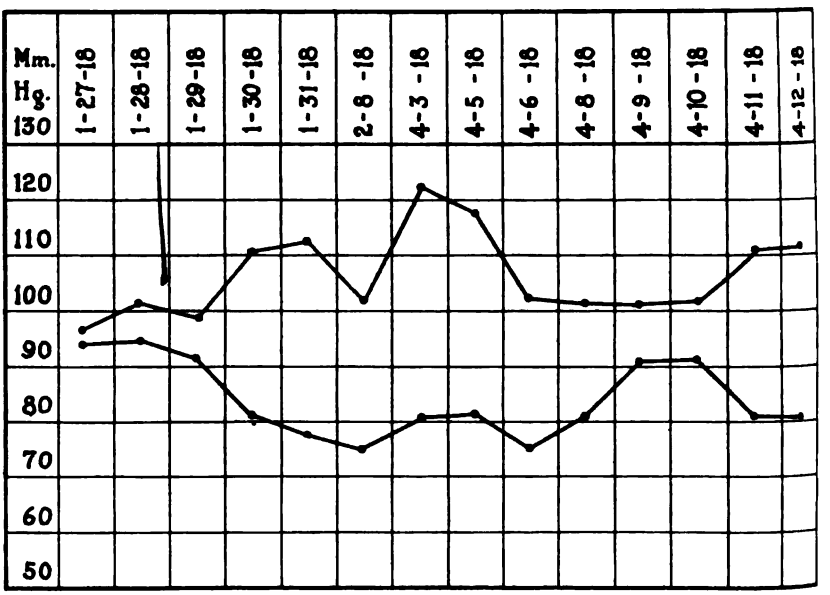
Dissection of the leg following amputation revealed a ruptured saccular aneurysm of the popliteal artery occupying the entire popliteal space. The skin over the aneurysm showed considerable pressure atrophy and discoloration. The wall of the aneurysm was very thin, softened and inflamed and had ruptured through its lower aspect. As a result, the outline of the aneurysm merged indefinitely with an extravasation of blood into the subcutaneous tissue extending about 4 inches down the leg. The aneurysm itself contained a soft loose clot.

In our opinion, the rupture of the aneurysm may be attributed directly to the action of the salvarsan on the wall of the sac. Subsequent to the injection of salvarsan in a case of tertiary syphilis presenting large, indolent incrusted ulcers, there resulted active inflammation and softening of the ulcers. Their edges became markedly swollen and they were surrounded with a distinct area of redness. It is very probable that the same sequence of events took place in the affected tissue of the aneurysmal sac, sufficient softening occurring to cause the rupture. It was most unlikely that the rupture was due to the fluid injected, as the solution was injected slowly and caused a rise of but 5 mm. in blood pressure. Furthermore, the rupture did not occur until at least 48 hours after the injection.

In view of the results obtained in this case, it is important to emphasize the danger of the administration of the arsphenamins in syphilis of the cardio-vascular system.

BLOOD PRESSURE CHART

Fig. 2



Upper line represents the systolic, lower one the diastolic pressure.

717-1

PERICARDIAL EFFUSION.[1]

By J. M. Perret, Lieutenant (J. G.), M. C., United States Navy.

Pericardial effusion is a comparatively rare disease; thus in the annual report of the Surgeon General, United States Navy, for the year 1916, in which are tabulated 39,094 cases of diseases, there was only one case of pericarditis. In the same report we find 4,092 cases of acute follicular tonsillitis, 81 of chronic tonsillitis, 219 of hypertrophied tonsils, 212 of acute rheumatism, and 72 of subacute rheumatic fever. Osler found 6 per cent of his cases of acute rheumatic fever to be complicated with pericarditis.

The rarity of pericarditis in the Navy is striking, when we consider the large number of cases of tonsillitis and rheumatism.

We do not yet fully realize the value of the X-rays in helping us to follow the progress of diseased conditions. We are too prone to be content with a single radiographic examination. A series of X-ray pictures would often give us very valuable information. What would we think of the clinician who would lay aside his stethoscope after his first examination of a heart or lung case? Let us use the X-rays more often to study the progress of our cases.

S. G. W., age 31, was admitted to the hospital on January 1, 1918, complaining of painful joints. Past history is irrelevant except that in February and August, 1917, he had very mild attacks of tonsillitis, without any complications.

Present illness dates back to six days previous to admission. The onset was gradual, with pain and swelling of both ankles. Several days later the left knee became involved. He had slight fever.

Physical examination was negative except that both ankles and left knee joint were painful, red, hot, and swollen. The hip joints were also painful. Temperature 100 F.

Laboratory findings: White count, 18,000; Neutrophils, 85 per cent; prostatic smear, negative; urine, negative.

The fever was moderate and ranged between 99° and 100 F., until January 7, when it took a sudden jump to 104 F. This marked the onset of a pneumococcic lobar pneumonia, which affected the left lower lobe and terminated by crisis on the seventh day. During the pneumonia the joints were normal. A week after recovering from his pulmonary complication the patient began to complain of a feeling of fullness under the upper part of his sternum. A pleuropericardial murmur was then heard in left mammary space, just at the edge of the heart. Ten days later the temperature rose to 100 F.

[1] Case report from the United States Naval Hospital, ensacola, Fla.

Physical examination now revealed a bulging of precardium. The apex beat could neither be seen nor felt. There was dullness on both sides of the sternum in first and second intercostal spaces, an increase of cardiac dullness to the left, and a well-marked obtuse cardio-hepatic angle. (Rotch's sign.) The heart sounds could not be heard at the mitral and tricuspid areas and were very faint at the base. The breathing was labored. The pulse was very weak, 130, irregular. The diagnosis of pericardial effusion was obvious. Skiagraph made on 1–28–18 showed the extent of the effusion.

The blood-pressure chart, figure 2, shows that during the period of greatest effusion there was hardly any pulse pressure.

Treatment was simple. The fluids were restricted and the bowels kept open with salines. An ice cap was kept over precardium. Sodium salicylate and sodium bicarbonate were given. Stimulants in the shape of tr. of digitalis and strychnine sulphate were administered by hypodermic. At the suggestion of Medical Director Smith a fly blister was applied to precardium.

Present condition of patient: It is now nine weeks since signs of pericardial effusion were detected. Symptomatically patient is well. The pulse is just a trifle fast, but is regular and of good volume and does not get abnormally fast after exertion. The apex beat is still invisible and can not be felt. The cardiac dullness is approaching normal.

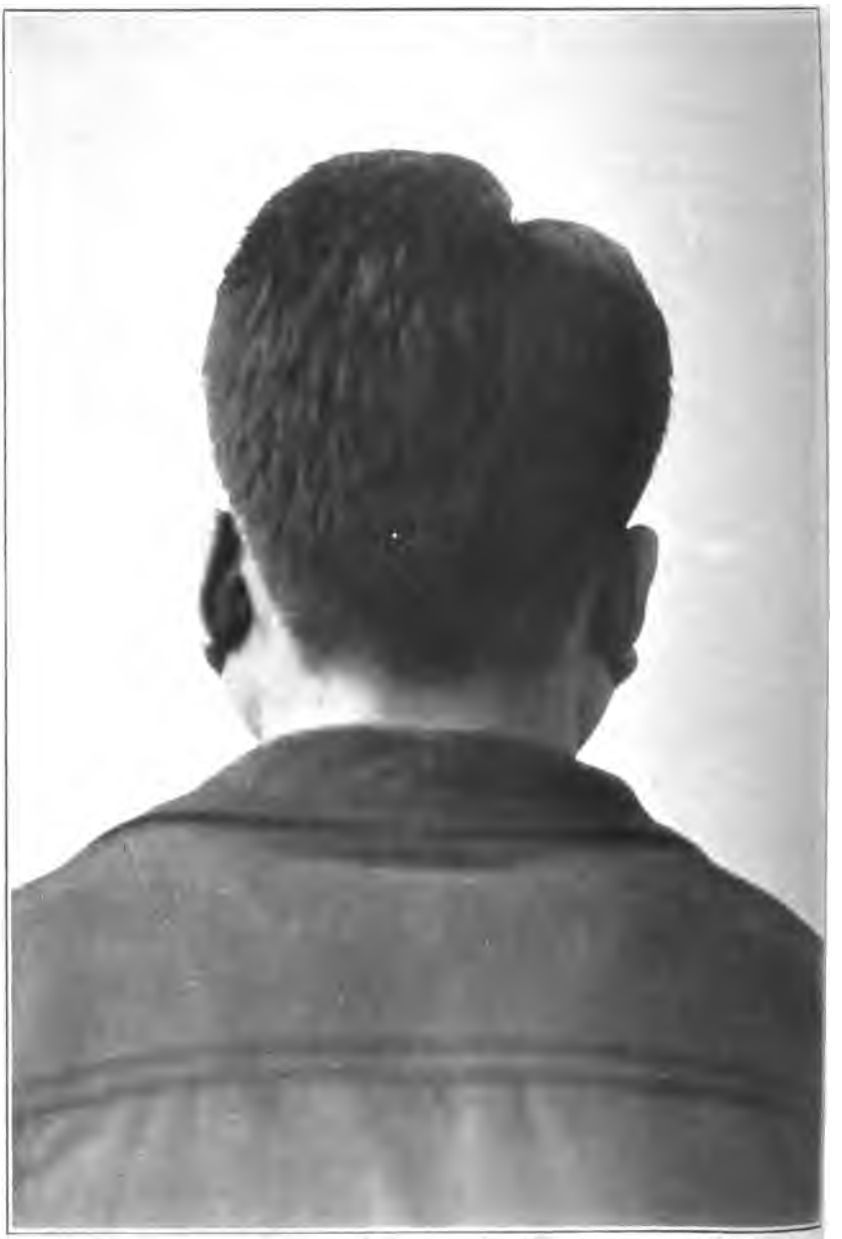
The patient was surveyed out of the service because it was not deemed likely that his heart could stand the arduous work of a seafaring life. If he can secure employment in civil life which will not demand too much muscular exertion, his prospects of getting along seem fairly good. It is well to recall the old paradox: "Persons rarely die of the disease with which they suffer."

Table of heart measurements from skiagraphs showing transverse diameters of heart. (fig. 3)

	Jan. 28, 1918.	Feb. 18, 1918.	Apr. 5, 1918.
	cm.	cm.	cm.
First intercostal space	10.6	8.7	7.5
Second intercostal space	15	11.8	10.6
Third intercostal space	18	16.2	15
Fourth rib	18.7	16.8	15
Fifth intercostal space	17.5	15	15

Symmetrical enlargement of salivary glands.

718–1



Symmetrical enlargement of salivary glands.

718-2

REPORT OF A CASE OF SYMMETRICAL ENLARGEMENT OF THE SALIVARY GLANDS.

By R. S. Boles, Lieutenant, M. C., United States Navy.

Symmetrical enlargement of the salivary and lacrimal glands was first described by Von Mikulicz in 1888.[1] Since that time the condition has been known as Mikulicz's disease. According to Riesman,[2] it is a "chronic inflammation affecting the lacrimal and salivary glands, but there are cases, evidently of the same nature, in which the salivary glands alone are affected." Some authorities believe the enlargement of the salivary glands is due chiefly to a diffuse lymphoid hyperplasia and not to the hypertrophy of the parenchyma proper. The etiology of the disease is unknown. Riesman classifies the cases into two main groups, namely, those with and those without blood changes. Among those without blood changes, there is a group presenting symmetrical enlargement of the salivary glands alone.

Filipino, age 27 years, wardroom steward, admitted to the United States Naval Hospital, League Island, Pa., with chief complaint that for three and a half years he had been troubled with a swelling below and in front of either ear. He states that the swellings first appeared in November, 1914, without any apparent cause. They quickly became the size of a lemon and have so remained. They occasioned no pain or discomfort. They appeared simultaneously and enlarged symmetrically and synchronously. His general health has been unimpaired. He believes that he had mumps at 7 years of age, but no swelling was ever observed after this.

He has never suffered from any disturbance of the salivary or lacrimal secretions. The family history is negative as regards tuberculosis and syphilis and no other member of the family has ever been known to suffer from a condition similar to his. The patient has been in the Navy three years and eleven months and taught school in the Philippine Islands prior to this. He does not recollect ever having had any parasitic infection or tropical disease and is not addicted to alcohol or tobacco.

The physical examination is as follows: The patient apparently enjoys good health. His station and gait are normal. The pupils react to light and accommodation. There is no enlargement of the lacrimal glands. The salivary and lacrimal secretions are normal. The pulse is regular and of normal tension. The epitrochlear and axillary glands are normal. The teeth are in good condition. The tonsils are not diseased. Both parotid glands are soft, of the same consistency and swollen symmetrically to the size of a lemon. They are not tender, not adherent to the skin and nonfluctuating. They do not interfere with the movements of the jaw. The lungs are normal on physical examination and this is confirmed by X-ray exami-

nation. Cardiac examination reveals a faint systolic murmur at the apex, following exercise. The knee jerks are a trifle exaggerated. The liver and spleen are not enlarged. The systolic blood pressure is 144 mm. and diastolic 72 mm. The urine is negative. Wassermann test negative. Hookworm ova were discovered in feces. With appropriate treatment subsequent examinations were negative.

The blood count was as follows:

Hemoglobin	Per cent (Sahli)	90
Red blood cells		6,390,000
White blood cells		6,000
Differential count:		
Polymorphonuclear leukocytes	per cent	51
Large lymphocytes	do	12
Small lymphocytes	do	23
Eosinophiles	do	13

The etiology of the case is obscure. Syphilis can be eliminated as a result of the Wassermann test and the history elicited. Aside from the eosinophilia which can be attributed to the presence of the hookworm, there is no evidence of leukemia, pseudoleukemia, or other blood disease. The case is therefore not one of a leukemic or pseudoleukemic origin. The case is absolutely noninflammatory, is of too long duration, and is not associated with a testicular disturbance, which eliminates the question of mumps. As X-ray examination and physical examination of the lungs is negative and there is no evidence of tuberculosis elsewhere, it is fair to deduce that this is not an etiological factor.

The chronicity of the swellings and their symmetrical distribution eliminates both benign and malignant tumors in the differential diagnosis.

The disease per se is not fatal. Treatment, except possibly by the X-ray, is unavailing.

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DENDRITIC CALCULI IN THE KIDNEY.

By G. G. Ross, Lieutenant, M. C., United States Navy.

F. F. McG., fireman second class, age 25, admitted February 10, 1918, from U. S. S. *Monaghan*. Upon examination, he complained of pain in upper right abdomen and right loin and of what he termed "stomach trouble." He had never been sick in bed in his life, but for the preceding five or six years had experienced at intervals a

Dendritic calculi of right kidney.

720–1

Early picture of foreign body in cornea.

sensation of fullness and heaviness in the epigastric region. There was distinct tenderness in the right hypochondrium, not only over gall bladder but extending outward to anterior axillary line. After several carefully studied gastric analyses had been made and treatment instituted, the patient's gastro-intestinal symptoms persisted. An X-ray examination February 28 revealed dendritic calculi in right kidney. Cystoscopic examination on February 28 showed normal function of both kidneys although four out of five urinalyses, immediately preceding this cystoscopic examination, showed blood. A culture of the catheterized specimen of urine from right kidney was sterile. On March 2 patient was transferred to surgical service.

On March 6 the patient was operated upon. An Israel incision was made in the right lumbar region. As the kidney was adherent both at upper pole and posteriorly, it was delivered with some difficulty. Through kidney cortex several large calculi could be palpated. A small incision was made into the convex surface of the kidney to enable the operator to verify the presence of the stones and to enable him to decide whether or not removal of the several calculi could be accomplished without complete destruction of the kidney substance; or whether or not nephrectomy would be the logical surgical procedure to be followed. As the calculi were very large and irregular in outline, filling up all the calices, they could be removed neither via pelvis nor via cortex without complete destruction of kidney substance and dangerous hemorrhage. Nephrectomy therefore was performed. There was no pus. Muscles sutured in series with catgut. Rubber tube drainage. Dichloramin-T was used to control an infection at lower angle of wound. Otherwise there was uncomplicated recovery. The removed kidney, when sectioned, showed large dendritic calculi in its calices.

FOREIGN BODY IN BRONCHUS.

By E. W. Gould, Lieutenant, M. C., United States Navy.

Eleven years ago in Providence, R. I., before she began her training as nurse, the patient inhaled a "beauty-pin" with five pearls. This accident occurred while she was lying down on her back at night, and was using the open pin to remove a temporary filling from her tooth. She dropped the pin into her mouth and at the same time took a deep breath. This accident caused so little irritation at the time that she was not sure that it had gone down her larynx and searched the bed closely to locate the pin if possible. She did not mention that fact to others until the next day when she had a slight sharp pain in the right anterior chest about the level of the fourth or fifth rib.

Bronchoscopy was done four days later at Providence, R. I., by a physician who was able to locate the pin, but was not able to remove it, because the point had become embedded in the mucous membrane. She was then taken to Philadelphia, Pa., where X-ray examinations showed the pin to be in one of the small bronchi in the lower right lobe not far from its present position.

During the succeeding years there have been very few symptoms. She has had occasional slight cough with mucous expectoration and occasional attacks of slight pain in the right anterior chest caused more frequently by lifting or vigorous change of position and by deep inspiration. She never spat up blood until early in May, 1918, when she had an hemoptysis of about 1 ounce of fresh blood, which was not preceded by severe cough. She has had a very slight cough since that time, but no blood has been seen in the small amount of expectoration. The general health is very good and the slight pains which she sometimes experiences in her right anterior chest do not in any way interfere with her duties. No signs of the presence of this pin can be made out by physical examination. The accompanying X-ray picture would seem to indicate that there had been very little irritation of the lungs surrounding the pin. Comparison with the X-ray picture taken 11 years ago shows that the pin is in practically the same position but that it has rotated on its long axis about 90°.

A CASE OF MULTIPLE SEBACEOUS CYSTS.

By G. A. Gray, Lieutenant, M. C., United States Navy.

The following condition was noticed on a recruit reporting for draft, and was thought to be of sufficient interest on account of its rarity to be photographed and reported for record.

Private H. G. M., United States Marine Corps, age 25 years, first noticed the appearance of a cyst on his scrotum about 10 years ago. The lesion started as a small yellowish-red swelling near the top of his scrotum and increased slowly in size. Before the first cyst had become very large others developed, and at the end of the first year of the condition there were seven tumors on the right side of his scrotum and eight on the left. Since that time other growths have made their appearance in no definite sequence, until at the present writing 114 cysts are noted, varying in size from that of a marble to that of a small bird shot. The lesions are usually symptomless but at times one or more break down with a typical discharge.

Eighteen years ago he had a small cyst the size of a pea over the left malar region; 10 years ago one the size of a hazel nut on his

Later picture of foreign body in bronchus.

722-1

Sebaceous cysts of scrotum.

left elbow; eight years ago a slightly smaller one in the right mandibular region. These were removed as they occurred.

At the Naval Hospital, Marine Barracks, Paris Island, S. C., one of the scrotal tumors was removed and diagnosed as being a sebaceous cyst. This diagnosis was confirmed after removing four of the tumors. The accompanying pictures present the subject graphically.

A CASE OF UNDULANT FEVER.

By J. C. Parham, Lieutenant Commander, M. C., United States Navy.

Undulant fever is almost a total stranger to the Navy returns of sick but upon learning that the destination of my ship would be in a zone where it is endemic I reviewed the literature of this disease in order that I might not overlook any cases that might confront me. One case has occurred on this ship and the history is interesting.

Ensign H. G. K., N. N. V., had been losing weight slowly for several months. Upon his annual physical examination which took place the latter part of January, a suspicious lesion was located in his right pulmonary apex. There was slightly increased vocal and tactile fremitus and harsh breathing with some prolongation of the expiratory murmur. No adventitious sounds could be heard. He was closely observed thereafter and a temperature chart started. He gave a history of malaise, and frequent headaches in the supra-orbital region. Several weeks earlier he had developed an otitis media which had yielded readily to treatment. His temperature chart showed a daily elevation to 99 or 99.5° F. There was no family history of note or personal history that pointed to tuberculosis. There were no night sweats or coughs and hence no sputum. He complained of constipation of recent origin. Several days later opporunity for consultation presented itself and another medical officer examined him. He was told the history of the case but was not informed as to my physical findings. He reported the same symptoms and the same signs that I had found in the area given above.

The patient's condition did not improve; temperature showed an increasing daily rise and he was surveyed as with "diagnosis undetermined" and transferred to the Royal Naval Hospital, Plymouth, England, on February 8, 1918, for diagnosis and treatment.

His temperature by this time was beginning to show a typical typhoid ascent and a Widal showed agglutination in 1–125. The medical officer in charge of the case did not confirm the chest findings and inclined to a diagnosis of typhoid or paratyphoid. Patient had had typhoid prophylactic in June, 1917. The Widal reaction was

negative for paratyphoid, A and B. Cultures of blood, feces, and urine were negative for B. typhosus and paratyphoid, A and B.

Diagnostic tuberculin could not be given on account of his temperature and by an unfortunate coincidence an X-ray of the lungs was impossible at the time.

Close questioning by the medical officer in charge, who had seen service in the Mediterranean, developed the fact that while ashore on patrol duty in Gibraltar some weeks previously, this officer had had tea diluted with goat's milk. An agglutination test was positive in 1–400 dilution for M. melitensis.

In this case the findings in the lungs which were corroborated by another medical officer; the fact that the patient had had typhoid fever in 1915 and the prophylactic less than a year previously; the fact that no milk is allowed on board when in Gibraltar and that all milk imported from Spain is required to be sterilized before being offered for sale, all served to lead to the conclusion that the case was one of incipient tuberculosis instead of Malta fever.

The latest available Annual Sanitary Report for Gibraltar, 1916, shows that during this year six cases were reported, the year previous two cases, and during 1914 three cases occurred. Investigation showed that five of the cases reported in 1916 originated in milk imported from Spain and that there was reason to believe that the milk had been sold unboiled. Such is believed to have been the origin of this case.

PROGRESS IN MEDICAL SCIENCES.

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Lieutenant Commander G. B. TRIBLE, M. C., United States Navy.
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Lieutenant Commander G. F. CLARK, M. C., United States Navy.
Lieutenant Commander W. A. BLOEDORN, M. C., United States Navy.

GENERAL MEDICINE.

STEPHENS, J. W. W., YORKE, W., BLACKLOCK, B., MACFIE, J. W. S., COOPER, C. F., and CARTER, H. F. **Studies in the treatment of malaria.** Ann. Trop. Med. and Parasit., May 11, 1918.

The authors have conducted a series of extensive investigations into the results obtained by the oral administration of quinine sulphate in simple tertian malaria and their conclusion should be of great interest.

In the observations recorded all the cases were adult males infected in Macedonia at least 6 months previously, and all had had more or less quinine during this period.

In every instance a diagnosis of simple tertian malaria was made by microscopical examination. In the vast majority parasites were present in the blood on the day treatment commenced.

Quinine sulphate in solution was given daily in two or more 10 or 15 grain doses. The cases are grouped according to the total daily dose given.

The continuous daily administration of quinine sulphate was tried, giving one series of cases 20 grains daily, another series 30 grains daily and a third series 45 grains daily. This treatment was continued for eight weeks. The authors endeavored to observe all cases for 60 days after cessation of treatment.

The results were based on the percentage of relapses both during the treatment and following cessation of treatment.

Practically all of the cases were able to take a daily dose of grains 20–30 for eight weeks or more. When, however, the daily dose reached grains 45 it was found that only seven out of nineteen cases

were able to complete the full eight weeks' treatment. In the remaining twelve the treatment had to be stopped prematurely owing to tremors and vomiting.

The authors conclude that the superiority of the grains 45 treatment is clear, as the maximum percentage of relapses possible in an observation period of 60 days is less than the observed minimum values in any of the other series.

Interrupted treatment, i. e., treatment on one or more days at intervals, instead of daily, over a given period was tried.

The treatments were given on two consecutive days each week and were extended over a period of eight weeks or more.

The cases were divided into a 10-grain series, a 15-grain series, a 30-grain series and a 45-grain series, and the results obtained were considered from a palliative point of view and a curative point of view the same as in the series of cases in which quinine was given continuously.

In comparing the results of the various forms of prolonged interrupted treatment the authors found it necessary to give two sets of figures as some of the cases could not be observed for the full period of 60 days after treatment; (1) minimum figure, i. e., the percentage actually observed to have relapsed; (2) maximum figure, i. e., one based on the assumption that all cases not observed for a period of 60 days relapsed before the expiration of that period.

The authors conclude that of the various forms of interrupted treatment used, the superiority of grains 45 treatment is clear, as the maximum percentage of relapses possible in an observation period of 60 days is less than the observed minimum values in the grains 10 series. The curative value of grains 45 on two consecutive days weekly for a period of 8 weeks—no relapse in an observation period of 60 days being the criterion of cure—lies between 71.4 and 61.9 per cent.

All the patients were able to take without difficulty the largest dose of quinine employed, namely, grains 45 (three doses of 15 grains) on two consecutive days weekly.

Comparing the results of the interrupted and continuous treatment the authors conclude that interrupted treatment with quinine grains 30 or 45 twice weekly is preferable to continuous treatment with quinine grains 30 or 45 seven times weekly. Grains 45 twice weekly is better than grains 30 twice weekly or than grains 30 daily, both as a palliative and as a curative treatment.

The interrupted treatment requires over any given period *only* two-sevenths of the quantity of quinine required for the corresponding continuous treatment. [W. A. B.]

Goetsch, E. Newer methods in the diagnosis of thyroid disorders; pathological and clinical. New York State Jour. Med., July, 1918.

The author from the study of numerous cases of thyroid disorders has devised newer methods in the diagnosis of these affections which should be of great interest.

He divides his present paper into two parts: (A) Functional activity of thyroid adenomata, as indicated by the cellular content of mitochondria. (B) Adrenalin hypersensitiveness in clinical states of hyperthyroidism.

Under the first heading the author outlines the difficulties which exist at present in establishing an association between clinical symptoms and histological structure in cases of adenomata, the ordinary grosser pictures of colloid hypertrophy and exophthalmic hyperplasia failing absolutely to indicate glandular inactivity on the one hand or secretory overactivity on the other.

There is an obvious necessity therefore of obtaining if possible a histological method which is capable of demonstrating within the cell structures which are closely associated with its functional activity. This is not a difficult matter to recognize in glandular organs such as the pancreas, whose secretory activity is evidenced by the appearance of zymogen granules. In the thyroid, as in most of the ductless glands, the existence of such definite granules is still problematical.

There are, however, other intracellular structures which have been known to exist in all living cells, whether plant or animal, which are closely associated in number and size with changes in the activities of the cell. These structures are known as mitochondria. They occur in the cytoplasm of all living cells whether plant or animal. In the higher power magnification the mitochondria appear as granules or as straight or curved filaments or rods of varying lengths up to four or five microns. They are most abundant in the active stages of the life of the cells and diminish progressively in number as the cells become senile.

The operative material of about 200 cases of thyroid disease was examined for the occurrence of mitochondria in the glands and some interesting and very constant results were obtained. Thus in the well-recognized cases of colloid goiter unassociated with symptoms of hyperthyroidism very few or practically none of these structures were found in the thyroid cells. In every case of exophthalmic goiter examined the mitochondria were found to be present in enormous numbers. Thus their occurrence in small or large numbers, as an index of functional activity of the thyroid cell, corresponds very closely to our conception of functional activity of colloid and exophthalmic goiter.

As further evidence of increased secretory activity of thyroid adenomata the author describes the "hypersensitiveness to adrenalin" test, which is carried out as follows:

The patient having been in bed thoroughly at rest a day or more previously and having become acquainted with the attending physician who is to do the test, is assured that the examination is in no way painful and is in no way associated with any danger.

Two readings are taken, at 5-minute intervals, of the blood pressure systolic and diastolic, pulse rate, and respiration. A note is made of the subjective and objective condition of the patient. This includes the state of the subjective nervous manifestations, the throbbing, heat and cold sensations, asthenia, and the objective signs, such as pallor or flushing of the hands and face, the size of the pupils, throbbing of the neck vessels and precordium, tremor, temperature of the hands and feet, perspiration, and any other characteristic signs or symptoms. These signs are all noted previous to the injection of the adrenalin so that comparison may be made after the injection.

A hypodermic syringe armed with a fine needle which, when inserted, causes little discomfort, is then used to inject 0.5 cc. (7.5 minims) of the commercial 1-1,000 solution of adrenalin chloride into the deltoid region, subcutaneously. Intramuscular and intravenous injections were not given. Readings are then made every 2½ minutes for 10 minutes, then every 5 minutes up to 1 hour, and then every 10 minutes for half an hour longer. At the end of 1½ hours, sometimes earlier, the reaction has usually entirely passed off. The repeated early readings are made in order not to miss certain reactions on the part of the pulse and blood pressure that may come on in less than 5 minutes after the injection is made. This is particularly true of cases of active hyperthyroidism.

In a so-called positive reaction there is usually an early rise in blood pressure and pulse of over 10 points at least; there may be a rise of as much as 50 points or even more. In the course of 30 to 45 minutes there is a moderate fall, then a slight secondary rise, then a second fall to the normal in about 1½ hours. Along with these one sees an exaggeration of the clinical picture of Grave's disease or hyperthyroidism brought out, especially the nervous manifestations. The particular symptoms of which the patient has complained are usually increased, and in addition there are brought out many symptoms which have been latent. Thus it is not uncommon to have extra systoles brought out, after the injection of the adrenalin. The patient is usually aware of them and may tell one that she has felt this same thing a year or two previously, at which time the symptoms of the disease were more active.

The following may all or in part be found: Increased tremor, apprehension, throbbing, asthenia, and in fact an increase of any of the symptoms of which the patient may have complained. Vasomotor changes may be present, namely; and early palor of the face, lips, and fingers, due to vasoconstriction, to be followed in 15 to 30 minutes by a stage of vasodilation with flushing and sweating. There may be a slight rise of temperature and a slight diuresis.

In order to interpret a test as positive it is regarded as necessary to have a majority of these signs and symptoms definitely brought out or increased.

A normal person shows no signs and symptoms, no reaction whatever on the part of the blood pressure or pulse, when 7 minims or 0.5 cc. of 1-1,000 adrenalin solution is injected.

The test has been of great value and help in the diagnosis of that large group of borderline cases resembling in some respects true hyperthyroidism, but without definite recognizable signs on the part of the patient generally or in the findings of the thyroid gland, which may not be palpably enlarged.

In summarizing, then, the following conclusions are drawn:

Thyroid adenomata are responsible of themselves for hyperthyroidism. They are often multiple and should be removed whenever it is possible to make the diagnosis. The very common belief among many physicians that they are innocuous and need no surgical treatment except when they produce mechanical pressure is incorrect. In a small percentage of cases, 2 per cent in this series, malignant degeneration occurred. Symptoms of hyperthyroidism disappear when an adenoma formerly active degenerates, only to be followed by a second wave of hyperthyroidism when a new healthy adenoma arises, as is so frequently the case. Almost every form of degeneration recognized by the pathologist can occur in these adenomata. The thyroid gland itself associated with an active adenoma presents a simple colloid appearance, contains few or almost no mitochondria, and is relatively inactive. The abundance of mitochondria in the thyroid cell forms a good index for judging of the activity of the tissue under consideration, whether this tissue be from active colloid goiter, exophthalmic goiter, or from an adenoma; the greater the number of mitochondria in the thyroid cell the greater the functional activity of the latter.

In states of hyperthyroidism there is a hypersensitiveness to adranalin whether administered hypodermically or intradermically, which hypersensitiveness is proportional in a remarkable way to the degree of hyperthyroidism present.

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The reaction to adrenalin should be of considerable value in the diagnosis of obscure borderline cases of nervous disturbances, which may or may not have their origin in true hyperthyroidism.

[W. A. B.]

MACALLUM, A. B. **The ancient factors in the relations between the blood plasma and the kidneys.** Amer. Jour. Med. Sc., July, 1918.

The author has drawn some very interesting conclusions from a long series of examinations of the inorganic composition of the sera of certain vertebrates, the function which the kidney exercises in regulating this inorganic composition and the ancient factor which appears to govern the concentration of the inorganic salts in the blood plasma.

Among all the organs with their varied history as to structure and function, the kidney function in one particular respect has not changed from the time it first began to evolve in the very far past. This function is the regulation of the inorganic composition of the internal medium of the body, known as the blood plasma.

The renal organ in the embryological history of the vertebrate is as ancient as the neural canal and appears to antedate the closure of this canal.

The salts of the blood plasma range between 0.78 and 0.88 per cent of the weight of the plasma, and they consist of the chlorides, phosphates, carbonates, and sulphates of sodium, potassium, calcium, and magnesium. The salts of sodium are by far the most abundant, after which come those of potassium, calcium, and magnesium in the order mentioned. The salts of sodium, chiefly the chloride, amount to more than 90 per cent of the total inorganic solids of the plasma.

The following table shows the elements arranged in values proportional to the most abundant one, sodium, which is made to equal 100, and shows a surprising resemblance in the values obtained from plasmas of all the mammals:

	Na.	K.	Ca.	Mg.
Dogfish (Ancanthias vulgaris)	100	4.61	2.71	2.46
Cod (Gadus callarias)	100	9.506	3.93	1.41
Pollock (Pollachius virens)	100	4.33	3.10	1.46
Dog	100	6.86	2.52	0.81
Mammal (average)	100	6.69	2.58	0.80
Man (C. Schmidt)	100	9.22	3.37	1.76
Man (A. B. M.)	100	6.11	2.71	0.85

The parallelism in the ratios of these elements in the highest as well as in the lowest vertebrates is a cardinal fact and suggests that

it is an endowment received from the common ancestor of both, the protovertebrate which must have existed in the early Cambrian or pre-Cambrian times.

The following table shows the striking parallel existing between the inorganic constituents of ocean water and the inorganic composition of the common jelly fish, Aurelia flavidula:

	Na.	K.	Ca.	Mg.
Ocean water (Dittmar)	100	3.63	3.91	12.10
Aurelia flavidula (Macallum)	100	5.18	4.13	11.43

The above table shows that the fluid in the tissues of Aurelia is but slightly modified ocean water and of the same concentration as the latter.

When the ratios for sea water were compared with the ratios of the blood plasma of a mammal, as, for example, the dog, there appears to be no doubt of their oceanic origin.

The horseshoe crab, Limulus polyphemus, which has had its habitat in the ocean since its origin in the Palaeozoic age, has a plasma in which the parallelism between it and ocean water is incontrovertible.

In both the lobster and the crab the concentration of the inorganic salts of the plasma appears to vary with the concentration of the ocean water of their habitat, and in brackish water it falls to that of the latter.

There is then a profound difference between the blood plasma of vertebrates and that of invertebrates. That of the latter varies more or less readily with an immediate change in the medium of the habitat, while that of the former is affected, and then but appreciably, only after millions of years.

The parallelism already referred to in the ratios of the elements in the different forms of vertebrates and invertebrates appears to indicate that the blood plasma of vertebrates was also originally sea water, not the sea water of the present age, but of a far past when the concentration of its salts was less than one-third of what it is now.

The kidney has maintained this concentration and these ratios, practically unchanged, through long ages of vertebrate history. It is this organ that has made a fundamental difference between the vertebrate and the invertebrate, not only in the struggle for existence but also in the capacity to evolve higher forms of animal life. The animal form that must accommodate its internal medium to that of its habitat has an enormous handicap when it changes its environment.

The author concludes from his examination of the plasma in Bright's disease that the very first change from the normal to the definitely established primary condition in some of the forms of Bright's disease is a loss of the power of the kidney to maintain the Palaeo-oceanic ratios. The structure in the kidney involved in maintaining these ratios consists of the proximal convoluted tubules, which are also concerned in reducing the H-ion concentration of the blood plasma.

The author regards the blood plasma, so far as its inorganic salts are concerned, as but a reproduction of the remotely ancient ocean, the original home of all life on the globe.

[W. A. B.]

CECIL, R. L. **Sensitized vaccines in the prophylaxis and treatment of infections.** Amer. Jour. Med. Sc., June, 1918.

The author describes the development of the use of sensitized vaccines with the results obtained by their use and reports a series of cases in which he used such vaccines both as a prophylactic and as a curative measure.

A sensitized vaccine is defined as a suspension of bacteria which has been previously treated with an homologous serum. The bacteria are washed before injection so that whatever antibody is present in the vaccine is firmly attached to the bacteria, and whatever value sensitization of a vaccine possesses probably inheres from the direct influence of the antibody on the bacteria to which it is attached.

Sensitized vaccine appears to have been more frequently employed as a prophylactic and therapeutic agent in typhoid fever than in any other infection, although Shiga used a sensitized vaccine for immunizing against plague and dysentery and Calmette and Guerin for protection against bovine tuberculosis in cattle.

Sensitized gonococcus vaccine has been extensively employed as a therapeutic measure with apparently gratifying results.

Sensitized streptococcus, staphylococcus and pneumococcus vaccines have been employed as well as sensitized tuberculin with results which appear to justify further work along these lines.

Besredka employed sensitized plague and typhoid bacilli in 1902 and found that the sensitized bacilli, both subcutaneously and intraperitoneally, were considerably less toxic than the nonsensitized bacilli; furthermore, that injections of sensitized bacilli were followed by an almost immediate increase in immunity, in contrast to the nonsensitized bacteria which excited first a so-called "negative phase."

The author has employed sensitized vaccines of typhoid bacillus, gonococcus, streptococcus and staphylococcus aureus and tubercle bacillus.

The typhoid vaccine was employed in 20 cases, in which it was used for prophylaxis. The dosage employed was the same as that usually employed with ordinary typhoid vaccine, namely, 500 million for the first inoculation and 1 billion each for the second and third. In 8 cases the vaccine was given at 7-day intervals; in the remaining 12 cases it was administered every other day. The latter method caused no unpleasant symptoms.

The local reaction produced by the sensitized vaccine was always mild and appeared to be less severe than that which usually follows an injection of ordinary typhoid vaccine. The lesser toxicity of the sensitized vaccine and its possibly superior immunizing power are sufficient reasons for giving it a trial.

Sensitized gonococcus vaccine was employed in 16 cases of gonococcus infection, chiefly gonorrhoeal vaginitis uncomplicated and complicated with endometritis, salpingitis, and arthritis. The inoculations were given at intervals of 5 to 10 days, the dosage varying from 100 million to 2 billion. The reactions were usually mild, there being usually, however, a sharp local reaction following the first inoculation. Six of these cases recovered completely, and all but 2 showed improvement.

The author employed sensitized tuberculin in 4 cases of tuberculous adentis, 3 of whom showed improvement and in 2 cases the glands disappeared. The author arrives at the following conclusions:

It has been shown by numerous investigators that a vaccine sensitized with an homologous serum produces less local and constitutional disturbance when injected subcutaneously, than does a non-sensitized vaccine. Even living virulent organisms when properly sensitized can be injected subcutaneously without serious consequences.

Sensitized vaccines have been extensively used for prophylactic and therapeutic purposes.

The sensitized typhoid vaccine produces a somewhat milder reaction than ordinary typhoid vaccine, and probably gives just as high an immunity. At the present time, however, the evidence for its superiority is not sufficient to justify the substitution of sensitized for ordinary vaccine in practice.

In the various infections treated with sensitized vaccines the results were, as a rule, no better than would have been expected with ordinary vaccine. It happened that in a few instances recovery followed the administration of sensitized vaccine after treatment with ordinary vaccine had failed. This may have been due to the fact that larger doses could be employed without untoward symptoms.

The chief objection to the general use of sensitized vaccines is the increased labor and time necessary for their preparation.

At the present time it would seem desirable to limit their use to the treatment of infections in which there is hypersensitiveness to ordinary vaccines or in which the latter have proved inefficacious.

[W. A. B.]

HELD, I. W., and ROEMER, J. **X-ray diagnosis of pulmonary tuberculosis.** Interstate Med. Jour., Volume 25, Number 4.

Everyone who has occasion to take or interpret X-ray plates of the chest should read and assimilate this article. It is seldom that so much of real value is found in such small space. Starting out with an exposition of the relative values and special uses of fluoroscopy and radiography, it is pointed out that neither is of any value in the diagnosis of tuberculosis unless proper focusing is used. As a result of poor focusing, shadows which stimulate disease are seen. In fluoroscoping a patient in the dorso-ventral position, with the tube at a level of the third or fourth dorsal vertebra, normal apices will appear shadowed.

In the normal lung both apices are not of equal dimensions and equally bright. The right apex, because of stronger musculature of the shoulder in right-handed people, throws a darker shadow than the left. The reverse is true in left-handed people. The least curvature of the spine darkens the apical shadow. Normal plurae and glands throw no shadow.

The primary focus (initial lesion) is in the lymphoid tissues of the hilus, a region inaccessible to any other method of diagnosis but the X-ray. The apices are now considered to be the primary focus in about 5 per cent of lung involvement.

The difference in appearance between healed and active lesions of the hilus are emphasized. The former is characterized by a dense elongated, quadrangular shadow, mostly on one side, which extends from the second to about the fourth rib along the outer border of the pericardium. The butterfly appearance is still maintained. From the hilus small strands project upward to the second rib and below to the base. Calcified glands varying in size from 2 to 10 mm. are seen mostly at the hilus. Acute processes originating at the hilus are generally unilateral, the shadow is denser than in healed lesions, the butterfly shape is obliterated, the area is circumscribed, and there may be evidence that several foci have coalesced. Vascularization is marked. Ringlike shadows of various sizes indicate dilated bronchi.

The fluoroscope is indispensable in the study of the apices. The first fluoroscopic impression as to the difference in the shadow of the two apices is of paramount importance. The somewhat darker shadow of one apex, often brightening up after prolonged fluoroscopy,

is of great diagnostic value. The cough phenomenon of Kreutzfuchs, which means the clearing up of the shadow by coughing and inspiration, should be observed. Early apical tuberculosis should be suspected if the shadow does not clear or if it clears less on one side than the other. Further evidence of early apical tuberculosis can be shown by study of the X-ray plate. An infiltrated apex is narrower than a healthy one, the presence of small glands is also positive evidence. The calcification of the cartilage of the first rib and the small heart, once famous as diagnostic features, are now discredited.

Certain anatomical conditions and lesions of a nontubercular nature may cause the apices to be shadowed. Nasal obstruction retarding entrance of air into the lungs, or pressure on the larynx, trachea, bronchi, or pulmonary tissue by thymus, enlarged glands, tumors, etc., cause collapse, induration and showing of the apices.

The classification of pulmonary tuberculosis by Gerhard, Turban, and others, depending on the amount of pathological involvement, is now being disregarded, and Peterson's method of classification and prognosis, depending upon the symptoms and general condition of the patient, accepted. This has been made possible by means of the X-ray. Peterson has emphasized certain clinical facts heretofore overlooked—i. e., that a person presenting but few physical signs in the lungs may succumb because tubercles erode a large blood vessel and produce fatal hemorrhage, or may cause meningitis or miliary tuberculosis, while patients with cavities may live for years in comparative comfort.

For the diagnosis of tuberculosis of the hilus, tuberculosis complicating chronic emphysema, for the indications and results of a therapeutic artificial pneumothorax, the X-ray supersedes all other methods of diagnosis.

[F. M. B.]

HERRICK, W. W. **Intravenous serum treatment of epidemic cerebro-spinal meningitis.** Arch. Int. Med., April, 1918.

The author's article is a report of observations on 208 cases of cerebro-spinal meningitis at the Base Hospital, Camp Jackson, S. C.

The following conclusions were reached:

1. "The disease is in most, probably in all, instances a primary meningococcus sepsis with usual, but not necessarily universal, secondary meningitis.

2. "The diagnosis can be made in at least 50 per cent of the cases in the premeningitic stage of sepsis.

3. "Treatment by large amounts of antimeningococcus serum intravenously, combined with active spinal drainage and intraspinal serum administration, has reduced the duration of the disease, the number and severity of complications and the mortality."

Maj. Herrick is of the opinion that the name of the disease, "cerebro-spinal meningitis," and of the causative agent has led to a single manifestation of the disease, the meningitis aspect, usurping such a prominent place in the commonly accepted ideas of the nature of the disease that important facts have been kept in the background and that the premeningitic stage of the meningococcus sepsis has for practical purposes been disregarded.

It is his view that in a recognition of this primary stage of sepsis lies the key to early diagnosis and more effective treatment. Appreciation of this fact resulted in the recognition by Maj. Herrick and his coworkers of primary meningococcus sepsis in almost half of the cases before the characteristic selective action on the meninges had been exerted; the recognition of abortive cases or of other types of meningococcus sepsis not showing meningitis, the establishment of intravenous serum therapy, notable reduction of mortality and, further, the development of clinical and laboratory methods of value.

Emphasis is laid on the fact that cerebro-spinal fever is a medical emergency, on the prompt recognition of which, and vigorous action, the life or future well-being of the victim depends more than in almost any other acute disease. To insure early diagnosis instructions were issued to regimental surgeons to refer at once to the Base Hospital all men complaining of headache, fever, vomiting, or other suggestive symptoms. This procedure afforded an exceptional opportunity for study of the early stages of cerebro-spinal meningitis and other acute diseases.

Meningitis was preceded by a stage of generalized infection which lasted from a few hours to three days, averaging about 48 hours, and a few cases, usually the abortive or fulminating, rarely those with prolonged course, never developed meningitis.

Recognition of the premeningeal stage of sepsis depended upon clinical and bacteriological evidence. Clinical evidence of the incipient disease is fairly definite for the practiced observer, although for certainty laboratory confirmation is usually necessary.

Tenderness of the eyeballs, dilatation of the pupils and in a few cases slight retinal edema with faint obscuration of the disk margins and fullness of the retinal veins were among the less common symptoms.

In a large proportion of the cases there was an upper respiratory tract infection, coryza, pharyngitis, tonsillitis, laryngitis, rarely bronchitis, in four cases of pneumonia.

The skin manifestations are considered the most important; of these, mottling giving a lead-colored appearance appears early. Tache cérébrale is constant but not of diagnostic value. A few cases have shown a puzzling macular rash. The predominant skin sign is the petechial rash which appears with astonishing rapidity in crops

about the shoulder or pelvic girdle, less frequently over the trunk, extremities, face, oral mucosa, and conjunctivae. The petechiae vary in size up to 1 cm., do not disappear on pressure, and last about three days, leaving a pigmented stain. In the presence of an epidemic this rash is considered diagnostic. A purpura is a feature of the fulminating cases; it develops with the greatest rapidity, and within a few hours considerable portions of the body may be covered. Maj. Herrick considers that next to the rash an unequal enhancement of the deep reflexes is the most valuable early evidence of the disease. While an increase in reflex irritability is not uncommon in a variety of infections the increase is uniform on both sides, while in cerebro-spinal fever it is unequal.

Headache of the "pressure" or "bursting" frontal or vertical, less often occipital, type occurred early in about 85 per cent of the cases, and chills were common. Rigid neck, Kernig's sign, and Brudzinski's were almost always *absent* during this stage. The clinical suspicion aroused by any combination of two or more of the signs or symptoms enumerated demand lumbar puncture.

During the stage of sepsis the spinal fluid is usually clear. In 60 per cent of his cases there was slight increase in pressure, a normal number of cells, the fluid reduced Fehling's solution and in some instances showed a trace of globulin. After long centrifuging and evaporation of several cubic centimeters of the fluid on a slide a few extra cellular polymorphous meningococci may be found. Repetition of the puncture often results in finding organisms. Capt. F. W. Baeslack, chief of the hospital laboratory, has found meningococci by blood culture in this early stage in 36 per cent of cases so examined. (Jour. Am. Med. Assn., 1918, 70, 684.)

The manifold complications of the epidemic constitute a strong argument in favor of the view that the disease is primarily a sepsis. The rapidity of invasion of the eye, for instance, points toward hematogenous infection. Prompt enucleation of the eye as a focus is urged in cases of panophthalmitis.

The myocardium seems to suffer little; one case of endocarditis, six of dry fibrinous, and two cases of pericarditis with effusion were noted. Otitis media was common but no case required mastoid operation. The accessory sinuses of the nose were frequently found filled with pus.

Three cases showed orchitis or epididymitis which was nonsuppurative and soon subsided.

Arthritis was a marked feature of the epidemic, but the prognosis is good and permanent disability rare.

The recognition that cerebro-spinal fever often occurs during the course of other acute disease is a matter of highest importance. The organism thrives in a soil prepared by any conditions which lower

resistance; hence change in environment, fatigue of travel, or of unaccustomed drill, and homesickness act in a manner similar to such acute diseases as measles, tonsillitis, or other respiratory infections.

The most marked constant finding in the 31 necropsies performed was a remarkable dryness of the body, muscles, and internal organs. No evidence of suppuration about the cribriform plate of the ethmoid or macroscopic appearances were found to suggest extension of the infection from that point.

The intravenous treatment has been based on the conception that the disease is, in its early stages, a generalized meningococcus sepsis which can be recognized before meningitis or other local complications occur. Instead of attacking a metastatic focus in the meninges endeavor has been made to reach the organism during the stage of systemic invasion by introvenous serum therapy.

The method finally adopted when a patient presented early symptoms was as follows:

If the fluid obtained from lumbar puncture was clear, no injection was made; if cloudy, enough was removed to reduce pressure to normal and a less amount of serum allowed to run into the canal. The fluid removed was transferred in a thermos bottle to the laboratory and meanwhile a small dose of serum was given to determine sensitiveness. One hour later 50 to 120 c. c. of serum were given by the veins from a large glass syringe. In a case of ordinary severity the intravenous dose was repeated every 12 hours until the temperature became normal or until six or eight injections had been given. In severe cases the serum was repeated every 8 hours until the desired results were obtained. In fact, the size and frequency of intravenous serum doses was like those prescribed by workers in Rockefeller Institute in lobal pneumonia. No ill effects from large doses were observed and sterilization of the blood was attempted by massive doses, especially in the early stages when a positive blood culture and a clinical picture indicated general hematogenous infection. When meningitis was established this treatment was supplemented by spinal drainage about half an hour after intravenous injection. Sufficient serum was introduced into the canal to relieve headache.

With large intravenous injections meningococci as a rule disappear from the fluid within 24 to 48 hours. Some prolonged cases in which the serum apparently acts as an irritant, causing delirium and headache, do better without serum. Second in importance to serum is morphine, which should be given freely, especially in early stages.

The total mortality in the entire series of 208 cases was 26 per cent. In the 129 cases treated by intraspinal methods alone or with intravenous doses of only 10 to 45 c. c. it was 31.7 per cent; in 79

treated with large amounts of serum intravenously and average or smaller amounts intrathecally, 16.4 per cent.

Mild cases do well under either treatment; it is in the most severe types that intravenous methods give the most striking results.

Maj. Herrick claims that the value of the treatment is found in the shortened course, diminished number of complications, prompt disappearance of meningococci from the spinal fluid, and decreased mortality.

In cases showing signs of a blocking of the foramina Lieut. Cobb devised a method of starting the flow of spinal fluid. Chloroform is given to relax the neck muscles and the head is manipulated to break up adhesions that may be forming about the foramen magnum and fourth venticle.

Liberal drainage and the use of this method is advised by Maj. Herrick when drainage is slight and symptoms persist.

[H. S C.]

Hoppe, H. H. The Medical Treatment of Graves' disease with special reference to the use of corpus luteum extract. Jour. Nerv. and Ment. Dis., April, 1918.

The author discusses the origin, structure, and physiology of the corpus luteum. He shows the results of various investigators who conclude that the corpus luteum is epithelial in character and is derived from the epithelial cells of the membrana granulosa of the Graafian follicles.

There are two kinds of specific cells in the corpus luteum, namely, the luteum cells and the paraluteum cells. The corpus luteum is therefore regarded as a ductless gland, pouring its secretion directly into the blood vessels and having a most important function in regulating the sexual life of woman.

Being one of the ductless glands, the ovary, perhaps through the corpus luteum, stands in relation to all the other ductless glands and is the avenue through which all the other ductless glands influence the function of the female generative organs.

Falta divides the ductless glands into two groups, the acceleratory group and the retardative group, in so far as they produce acceleratory or retarding hormones. These groups through their hormones exert an antagonistic effect on the metabolic process of the body. Thus, the hormone of the thyroid gland is regarded as acceleratory. It quickens metabolism and increases excitability, as is evidenced in Graves' disease, whereas the absence of this hormone which we see in myxedema, causes an arrest of growth or an inhibition of metabolism. Opposed to this action is the group of glands with retardation, anabolistic, or assimilatory hormones. The author regards the secretion of the corpus luteum as having this function.

As the result of his clinical experience in the treatment of Graves's disease, he suggests that the internal secretion of the corpus luteum has an inhibitory effect on the thyroid secretion, and that hyperthyroidism is an expression of a dysfunction of the corpus luteum in the female and of the interstitial glands of the testicle in the male.

The most serious objection to this theory is that typical Graves's disease rarely follows removal of the ovaries and testicles. However, there is a marked increase in the size of the pituitary after castration in both male and female and this may mean a physiological compensation of function.

The author had treated about 20 cases of Graves's disease in the past three years in which the ordinary Forchheimer treatment was attended with only indifferent success. The combination, however, of the quinine hydrobromate, extract of belladonna with the extract of corpus luteum, was found to be rapidly beneficial in nearly all the cases and the improvement was usually so rapid and so marked, in a few days to a week, as to be accounted for only on the ground that the corpus luteum was the active therapeutic agent. These cases were all clinically cases of Graves's disease, no doubtful cases being included.

The most notable and prompt improvement is in the cardiovascular symptoms. The pulse rate drops very quickly and the disagreeable symptoms caused by the disturbance of circulation quickly subside. Then the general nervous irritability diminishes and the patients return to more or less normal condition. They show a tendency to relapse, however, if they stop the extract of corpus luteum.

The author regards the Graves' symptom complex as a result of a defective or deficient secretion of the corpus luteum which when replaced by giving the extract of corpus luteum continuously results in improvement and a fairly normal state.

[W. A. B.]

HAYNES, R. S. **The differential diagnosis of enlargements of the cervical lymph nodes.** Arch. Pediat., April, 1918.

The author divides enlargement of the cervical lymph nodes into three classes as follows: (*a*) inflammations—simple or tuberculous, (*b*) hyperplasias, and (*c*) neoplasms.

The commonest forms of enlargement of these lymph nodes are the infections or enlargements secondary to bacterial invasion of structures of the head and throat whose lymphatic drainage terminates in one or other of the groups of lymph nodes situated in the superficial or deep structures of the neck.

Hyperplasias of the lymph nodes occur typically with the infectious diseases, particularly the exanthemata, scarlet fever, measles,

German measles, and diphtheria, or in syphilis and, more rarely, generalized tuberculosis; in leukemia, Hodgkin's disease, and the glandular fever of Pfeiffer.

Neoplasms are the least common of the enlargements and as types are mentioned lymphadenoma, lymphosarcoma as primary diseases and carcinoma as a secondary process.

Enlargement of the cervical lymph nodes, other than that due to infections, is usually accompanied by signs of disease elsewhere which serve to establish a diagnosis even if the enlargements themselves can not be differentiated. The glandular swellings accompanying the exanthemata are acute and the symptoms and physical signs of the primary disease are present. Those of scarlet fever are typically of the deep cervical glands, both anterior and posterior, and may progress to intense infiltration and to suppuration.

The enlarged lymph nodes of diphtheria are also acute and overshadowed by the symptoms of the primary disease so that the diagnosis is reasonably certain. In measles the enlargement is apt to occur days or weeks after the original disease.

In mumps the swelling of salivary glands may be confused with corresponding groups of superficial lymph nodes. Particularly is there likely to be confusion between submaxillary mumps and enlargement of the submaxillary nodes; the latter are situated above the salivary gland, often on the horizontal ramus of the mandible. A bilateral swelling in this region serves to establish mumps as the diagnosis.

The acute glandular fever of Pfeiffer runs a characteristic course of fever, constitutional symptoms, and enlargement, usually bilateral, of the deep cervical lymph nodes. The nodes may become the size of walnuts, but are discrete, hard, very sensitive, do not suppurate, and subside after a week or two.

The enlargement of cervical nodes which occurs in syphilis is part of a general adenopathy. The posterior cervical group is likely to be involved. The nodes are discrete, without signs of inflammation, and not adherent to adjacent structures. The Wassermann reaction and the luetin skin test will clear up the diagnosis.

Hodgkin's disease shows constant progression of enlargement without coalescing or suppuration, the involvement of other groups of nodes, particularly within the thorax and abdomen, the splenic enlargement, and progressive anemia.

Lymphosarcoma may resemble Hodgkin's disease at first but there is a tendency for the capsule of the node to rupture and the nodes to become adherent to each other and the surrounding tissues.

Acute lymphatic leukemia presents enlargement of nodes up to walnut size, discrete and with little or no redness or tenderness. The diagnosis is made by blood examination. Anemia with 1 to 3 mil-

lion red blood cells, hemoglobin of 20 to 30 per cent, and leucocytes of 50,000 to 150,000, of which 90 to 98 per cent are lymphocytes, complete the picture.

Enlargement of the occipital, mastoid, preauricular, and parotid nodes may be due to a tuberculous infection such as lupus but more probably is due to a pyogenic infection such as results from eczema, pediculosis, furunculosis, fissures, and cracks about the nostrils or corners of the mouth.

Enlargement of the submental and submaxillary groups may be due to pyogenic infection of the teeth and gums.

Differentiation between simple and tuberculous infections may be very difficult. In pyogenic infection there is likelihood of evidence of inflammation in mouth, throat, or nasopharynx. Usually the swelling is larger, comprises more lymph nodes, has more perinodular swelling, is tender, reddened, hot, and elastic, all the tissues being bound up in the swelling.

Examination of the blood will show a polynucleosis in pyogenic and a lymphocytosis in tuberculous enlargements. The tuberculin test, the complement fixation test, or the von Pirquet reaction are valuable aids in diagnosis.

In some cases excision of the gland itself may be necessary for a positive diagnosis.

[W. A. B.]

SURGERY.

ALVAREZ, W. C. **Is the purgation of patients before operation justifiable?** Surg., Gynec., and Obst., June, 1918.

The author's views are startling and would, perhaps, be more convincing if he were less radical, but it is rare for crusaders to occupy middle ground. There is probably no single detail of surgical procedure upon which there has been such worldwide agreement as the rule to evacuate the bowels of a patient about to undergo operation under a general anesthetic. It is no easy matter to renounce the habits of years, and the more fixed and universal a practice has become the more likely it is to outlast its usefulness. When the propriety of such a measure is questioned in a dispassionate and scientific way we should listen to the arguments without prejudice.

Dr. Alvarez claims (1) that the administration of the anesthetic is not rendered more safe or easy or agreeable by preliminary purgation; (2) that preliminary purgation does not lessen the danger of autointoxication, gas pains, or peritonitis, but, if anything, tends to induce these conditions through disturbance of the normal mesenteric circulation.

The author states that the idea of preparation preliminary to operation is partly ascribable to the patient's desire for some such thing and must be a "relic of medical practice 2,000 and more years ago." He connects it with the humoral theory of disease.

Experiments on rabbits demonstrated that purgation induced apathy and appearance of sickness. The bowels were found injected, full of gas, sometimes atonic and flabby, often irritable here and there, and inclined to contract down into hard white cords. In many rabbits the mesenteric vessels and intestinal walls were engorged.

The author's summary of reasons for avoiding purgatives before operations are in part as follows: Purgatives "bring about pathological conditions by interfering with intestinal absorption and upsetting the balance of salts. The body is weakened and not strengthened." "There is an increased growth of bacteria." "There is a tendency to flatulence and distention." "Purgation makes the bowel react poorly to drugs." "The purge must be responsible for some of the post-operative nausea and vomiting."

While not agreeing with the contention of the author, the reviewer hopes that the article in question will be widely read and believes that it will do good because there is undoubtedly a great deal of thoughtless prescribing and there are not a few in the ranks of our profession who believe that if a thing is good the more of it the better. We habitually speak of severe or mild purgatives and dictionaries classify them as drastic, simple, saline, laxative, etc.; therefore the term "purgation" does not imply the production of excessive alvine discharges. To induce violet enteric activity and copious loss of fluid does seem irrational and, of course, in certain cases even the mildest purgative will be harmful, as in cases of appendicitis, intussusception, volvulus, etc. Alvarez says:

> If a patient's bowels move normally every day and particularly if they move on the morning of the operation, as they probably will do if breakfast is allowed, no enema should be given. Enemas need be given only to those who are definitely constipated.

This view of the situation seems optimistic in the extreme. A considerable proportion of surgical patients are women, and women as a class are notoriously constipated. While they may have established a very considerable degree of tolerance for the presence in the body of 1 or 2 pounds of excrementitious matter, most men are apt to be rather miserable when the bowels are inactive. Patients have a right to expect that these details will be considered by the medical attendant before and not after the operation with its inevitable discomfort and possible suffering. It is our observation that the change of habits ncident to becoming a hospital patient tends to constipation and that a satisfactory stool on the morning of operation, breakfast or no breakfast, is rarely to be expected.

We sincerely hope that the third-day purgative will continue in vogue in obstretric practice, because we have vivid recollections of the increased comfort and well-being that came to the women of the lying-in ward when they were relieved of their faecal accumulations. Experienced matrons often begged for the "C. O. and G." on the second day, and there were few who did not admit afterwards that the relief secured amply made up for the horrid taste. The third-day purgative constantly brought down slightly elevated temperatures or seemed to do so. If not related as cause and result, still the two events were constantly related in point of time.

The trouble with purgation before operation is that it is part of a routine procedure, and routine procedures, though beneficial in many ways, have huge disadvantages as well. Had Dr. Alvarez contended that the routine administration of *drastic cathartics* prior to operation was wrong there would be no dissent. Routine procedures make hospitals run smoothly and are good, but in the long run that surgeon will have the most lasting success who, besides manual dexterity and diagnostic acumen, possesses an insight into temperament and can spare the time to inquire about the individual habits and needs of his patients. The patients of such a surgeon will have adequate preparation for operation, but it will probably not be the same in two cases. For one a cheerful smile or a reassuring word about the children at home will suffice, and for another a very liberal stimulation of the emunctories may not lead to drastic catharsis. As to the unsatisfactory and disagreeable action of salts, we are in hearty agreement with the author and recommend as a substitute a fluid preparation of cascara, castor oil given in a sirup of rhubarb, or the palatable and thorough compound licorice powder.

Corner, E. M. The surgery of painful amputation stumps. Proc. Roy. Soc. Med., May, 1918.

As shown by Marinesco, the chief factor causing pain in stumps to be fitted with artificial limbs is inflammatory change within the nerves, and it has been found as late as 38 months after the amputation in a healed stump. Amputations were rather neglected before the war and in large hospitals used to be handed over by the surgeon to his house officer. Painful nerves in stumps were not unknown before the war, but painful scars and bulbous nerve endings were uncommon. In 1913 there were no such cases among 529 applicants for artificial limbs to the Royal Surgical Aid Society. In 1915 began the work at Roehampton House, and here, out of the first 93 cases sent to be fitted with artificial limbs, 38 were found to be unready. However, now, improvement in the technique of amputations is progressive.

The end of a nerve in healing has to go through three stages, which may be brief but can not be obviated. They are: First, the stage of repair inflammation; secondly, the stage of compression; thirdly and finally, the stage of regeneration. To reduce the first stage it is necessary to close the end of every structure left open by the cutting and sawing of the amputation. There must be no infection, so that the wound can be closed without drainage and without the discharge of serum from open ends. Amputation surgery is complicated by an additional difficulty of a threefold character—namely, the compression, inflammation, and regeneration of nerve endings. Active inflammation is kept alive by the irritaton of unabsorbable ligatures. It is curious that with the changes in the nerve endings the products of irritation from ligatures should be carried to the nerve lymphatics. The condition reminds one of tetanus, in which the poisons are conveyed by the neural lymphatics to the nervous system. The resemblance is increased by the spasmodic cramplike pain.

Compression acts in hundreds of ways. It is mainly brought about by the contraction of the fibrous tissue on to the expanding, growing tissue of the cut nerve end. "The contracting cap of fibrous tissue over the nerve end is derived from the endoneurium, perineurium, and epineurium coats of the nerve. Through the meshes in them the unprotected regenerated fibers have to pass. This is the main place at which the strangulation of the nerves takes place. If any of the nerve sheaths can be uninjured in the division of the nerve, so much less the strangulation of the new nerve fibers to be formed by regeneration. This is shown by the different shapes of the nerve endings if the epineurium is preserved or not. If no epineurium is retained the nerve ending is truly bulbous. If the epineurium is retained the nerve ending becomes pencil shaped. Between these two extremes there are any number of variations in the shape of nerve endings, such as those obtained by my 'swinging-door method' of dividing nerves." The distal division is made with a sharp instrument by two oblique snips meeting centrally at an acute angle. As the nerve, which has been pulled down and obliquely divided by two cuts, one from each side, retracts, the cut surfaces become coapted.

In order to produce a painless stump the inflammatory stage and the contracting of scar tissue must be over before the nerve fibers push their way out of the nerve bulb and through the mesh of the "internal" scar.

The following paragraphs are quoted literally from the author's paper:

Normally, more or less of this takes place, but in these war cases regeneration begins very early after nerve injury and its processes

proceed rapidly, this perhaps being due to the increased vascularity brought about by the inflammation and the irritation of the sepsis. Thus the nerve fibers begin to regenerate in a few days, according to Italian authorities, and they branch and branch again; one original fiber becoming represented by many fibers, each of which is a potential source of trouble—it may encounter an inflammatory nodule or become compressed. Thus, possibilities of future trouble are manifold; the early regeneration enables the young fibers to become long enough to be strangulated before the scar tissue has ceased to contract, and the greater number of branches of new fibers make the occurrence of trouble still more probable.

After the growing fibers of nerve regeneration have escaped from the nerve bulb and the zones of certain and possible compression, they follow the direction of the scaffolding of connective tissue and make their appearances in strange places, completely foreign to the course of a nerve. For instance, in one example regeneration had taken place from the sciatic nerve and reached the popliteal artery, where part of the advancing regeneration fibers followed the artery through the adductor magnus and appeared on the front of the thigh, forming a tender lump. In other cases the progress of the regeneration fibers is like the course of a river, and where an obstruction is met the flow pools up until the obstruction is overcome. Thus regeneration neuromata are formed and mark the site as a regenaration "pool." No less than three neuromata were present, attached to the long saphenous nerve in the case of Thomas and the small sciatic nerve in the case of Anstey. So far as I know at present these regeneration neuromata seldom possess foci of inflammation, but they may be sources of pain, not of spontaneous pain but they cause pain when pressed upon.

In inflammation and compression, two forms of the causation of pain are in evidence. The inflammation does not remain in the nerve bulb and only extended peripherally, but it also progresses up the nerve as an ascending neuritis.

Clinically there may be distinguished at least five types of pain in amputation stumps, the first of which is universal and the last uncommon.

First. Early pain, coming on immediately after the amputation, dependent on an endoneuritis set up by the injuries inflicted on the nerves at that operation. When alone present this accession of pain dies away in a few days or weeks.

Secondly. Compression pain, coming on about two months after the interval and sometimes steadily increasing.

Thirdly. Inflammatory pain. The early pain never passes off, or it may become paroxysmal and severe, or it may even be still more clearly defined, as in a man recently under my care.

Clinically these cases may be grouped in a series; pain immediately after the operation is due to the trauma of that operation and the inflammation of the repairing tissues; a little later, after from 2 to 10 months, the pain is due to the compression of the nerve fibers by the contraction of scar tissue; later still, pain is due to active inflammatory changes in the nerve ends.

The *fourth* clinical type is produced by the regeneration of nerve fibers. It is characterized clinically by more continuous pain and illusions as to the presence of the missing part; for instance, the amputated foot. The pain is acute, and first appears within a few days of the amputation. At first it is not great, but increases in severity.

The fourth type has clinical features of both the second and the third type.

The *fifth* type is only recognized clinically by the process of elimination; nerve trunk after nerve trunk is removed by operation and their consideration eliminated by trustworthy surgery. Still the pain and tenderness persist, and are not of neurotic origin. The pain may originate from the irritation and inflammation round a silk ligature or other foreign body. Or the skiagram may show that it is due to disease in the bone; terminal rarefaction of the bone is due to the injuries of operation and the healing of the wound, but when the bony changes are farther afield they are partly due to nervous irritation—dystrophy. Such cases exhibit the usual signs of bone pain, night pain, and pain in wet weather, and are very persistent. They are frequently called neurotic patients, but the fault is not theirs but ours—we have not found out the cause of the patient's pain. We should bear the reproach. The stumps of patients of this type frequently twitch and twitter.

It would appear then that there are many causes for nonnerve-trunk pain in amputation stumps, and these may be classified according to their source of origin—bone pain, muscle pain, ligature pain, and joint pains. This class of case is one of the most interesting to study. In the exploitation and unraveling of these cases one speedily becomes aware of the fact that this infective inflammatory wound callus has the greatest tendency to spread along vessels and easily envelops the nerves which may accompany them, and, further, that this condition is made worse by the presence of unabsorbable ligatures, irritation produced by which maintains the inflammation.

One of the most successful amputations of the whole war is a supramalleolar amputation of the foot, a Syme's amputation. With it the patient can walk as well as he ever did and follow his ordinary avocation. Unfortunately the Syme stumps are sometimes tender. The stump is ideal to look at. The explanation of the painful stump is almost always the same—the *posterior tibial nerve is strangulated*

by the large internal scar. The anterior tibial nerve has either been retracted or cut short. The posterior tibial nerve is not so easily found and is rarely cut short. Some of these posterior tibial nerves become strangulated; the majority escape. By the contraction of the fibrous tissue they may be tied to the posterior surface of the tibia or pulled under the newly fastened down tendo Achillis.

The swollen and œdematous strangulated end of the nerve is easily demonstrated. In fact, for the demonstration of nerve strangulation I know of no better stump. The nerve lies in the heel flap which was brought over the end of the amputated limb, covering it entirely, a long flap carrying a nerve. The retraction after the division of the nerve trunk is well shown, but I have never found trouble with this nerve as it lay in the flap, but higher, about the level of the external skin scar. Theoretically these nerves should be divided at the level of the skin incision, but practically, as teachers of operative surgery known well, the nerve is redivided higher up in the freeing of the heel flap. So it escapes lower down as it lies in the heel flap.

The anterior tibial nerve always escapes as its end retracts and is not exposed to the irritation of the healing wounds; and the incision is so situated that the nerve end is wholly above the amputation. The anterior tibial nerve always escapes and the posterior tibial nerve always gets strangulated.

But why is there such a high percentage of painful nerve bulbs in the amputation stumps of the upper arm? The nerves and muscles here are included in one big cicatrix whose lower end is at the amputation, forming a neuro-vascular bundle. This formation is only found here, not elsewhere. It is peculiar to this part principally, I believe, for two reasons: First, on the inner side of the upper arm there is a huge lymphatic and blood course, enabling the rapid and extensive formation, and subsequently contraction, of scar; secondly, in this situation the nerve endings are only covered by a thin sensitive skin. Bony formations here are unusual, whilst they are plentiful and a distinctive feature on the posterior and inner part of the thigh.

Almost all the amputations through the arm have been done by means of the circular method. In view of the formation of so large a scar, involving so many nerves, it is better to convert the circular amputation into a racquet incision, and, through the incision representing the handle of the racquet lying over the vessels and on the inner side of the arm, the nerve can be removed. A great length of nerve can be removed, as the nerves which become painful and bulbous have no branches of importance in the arm. The median nerve, the ulnar nerve, and the internal cutaneous nerve can be removed up

to the axilla; and the musculo-spiral nerve can be removed as far as its junction with the circumflex nerve.

Forearm stumps, bearing very little pressure, are very unusually painful. In the neighborhood of the wrist the median and ulnar nerves would seem to be seldom nipped or inflamed, but they regenerate into infective fibrous tissue and into adherent tendons, the regeneration here, as elsewhere, being a new formation, and invading structures like malignant disease. The pull of the tendons or the inflammation and cicatrization of the scar tissue sometimes makes their excision necessary. The mass of tissue might be compared to a fruit and the nerve to the stalk. Sometimes these are very troublesome cases.

(1) Tender nerve bulbs should be excised together with a long piece of nerve so as to get above any perineuritis or ascending neuritis there.

(2) The best method of removing a nerve is by means of the epineural sleeve.

(3) Drainage should always be employed. A good-sized tube is used. Its nonuse leads to hemorrhage.

(4) All ligatures and buried sutures should be of absorbable material to minimize sources of irritation.

(5) Injections of alcohol, quinine, and urea, etc., should not be used, as about three or four fifths of an injection flows out of the nerve into the surrounding connective tissue, causing later a large formation of scar tissue round the nerve and its subsequent strangulation.

(6) Fixation abscesses are easily produced by tucking gauze or part of a swab into a recess of the wound and leaving it there. They seem to attract a certain amount of the infection to the abscess, which, when the gauze is removed, allows that sepsis to drain away. Perhaps these fixation abscesses are more frequently made unintentionally than intentionally, and are at times most beneficial. The gauze may be left there as long as three or four weeks. They certainly seem to relieve the pain in some cases—infective cases for instance—and are a good counterirritant.

Another method for relieving pain is the use of an old-fashioned seton of gauze put through the skin of the stump a little above the amputation.

The recommendations that I would make to those surgeons doing the amputations are:

(1) Let technique be as surgically clean as possible. Much harm results from "lighting a fire" in a wound.

(2) Use only absorbable sutures.

(3) Cut all nerves as short as possible, using the "swing-door method" to close their mouths.

(4) Cut all vessels short, as they form the greatest channel for the spread of infection. By cutting them short "the door is closed."

(5) Drain temporarily all amputation wounds, using a large tube and at least one.

(6) Start the Carrel-Dakin treatment at the time of operation in dirty cases.

(7) In clean cases close the deep wound with a few catgut stitches.

WILLEMS, C. **Abdominal self-protection in war surgery.** Belgian Medical Archives, 1917.

Among the few symptoms that may be considered pathognomonic in surgery is rigidity of the abdominal wall. This symptom or sign should be sought in every case of injury to the belly or where chest, loins, or pelvis are involved. The examination is made with the patient on his back, the head low, the thighs flexed, the knees apart, the mouth open. The patient is told to relax the abdominal muscles as much as possible. The hand is placed flat on the belly, slow gradual pressure is made. Gentle, steady pressure may cause pain, but if rigidity is not present the abdominal contents may be compressed by this maneuver. If rigidity is present the muscles become hard and boardlike and offer stubborn resistance to pressure. In its most conspicuous form abdominal rigidity is general but there may be localized rigidity only.

General rigidity indicates a perforation of the peritoneum, but does not prove a ruptured viscus. Large hemorrhage excites general rigidity. Less severe hemorrhage would excite less rigidity.

General rigidity varies in character. It is seen best in cases of perforation of the gut. Here it appears early, extends over the whole belly, and passes away before septic peritonitis is fully developed.

Perforation of the bowel usually shows general rigidity prior to the development of peritonitis. Rigidity is less when it is caused by hemorrhage.

Wounds of the liver, if not excessive, may show results almost identical with those due to a perforated gut.

Injuries to the kidney may cause localized rigidity which might be a misleading symptom.

DANIELOPOULU, D. **Typhus fever.** Archives of heart disease, 1918.

The red blood count is normal unless there is cyanosis with cold extremities. Then the blood is blackish in color and shows a polycythaemia of 7,500,000. In the great majority of cases the leucocyte

count is raised. Sometimes there is an initial reduction, but this rarely lasts. In mild or moderate cases the leucocyte count may reach 20,000. In grave and fatal cases the leucocytes may reach toward the end as high as 128,000.

In the differential leucocyte count in typhus Danielopoulu arrives at conclusions rather different from those of previous observers. He finds that a mononuclear increase, due to the large and medium sized cells, is the predominant feature, and he has followed fatal cases with a mononuclear percentage of 50, 63, 68, 71, and even 76. The polymorphonuclear leucocytes and the large mononuclears often show degenerative vacuolation of their protoplasm. Granular neutrophil myelocytes are very rare and nucleated red blood cells even more so. The blood almost constantly shows the presence of mononuclears with highly basophil protoplasm without granules and with an eccentrically placed nucleus; these cells vary in size; some are quite small and the largest measure 20 μ; they are oval or more rarely round.

Dennis, F. L. Tonsillectomy in the tuberculous. aryngoscop, St. Louis, November, 1917.

Difficulty was encountered in estimating the direct results of tonsiliectomy in these cases—first, some cases were well on toward recovery, at time of operation, and continued to improve, which probably would have occurred without operation; second, there was lack of definite information regarding the condition before operation, and inability to follow case afterwards; third, it was impossible to judge exactly what effects the operation has had on the tubercular process.

In general, certain conditions must be observed; a time should be chosen when the lungs are relatively quiescent, ether is contraindicated; local anesthesia if possible.

After operation, the author advises the application of tincture of iodine to the wound.

In general, his experience has been favorable.

[G. B. T.]

Reprints and extracts from the Medical Supplement to the Daily Review of the Foreign Press. Issued by the General Staff, War Office, London.

Volume 1, No. 6 (June 1, 1918), contains an illustrated article on *prosthetic appliances*, in which the history of artificial arms and hands is given in detail, beginning with the artificial arm used by Götz von Berlichingen in 1509 which is preserved in Nuremberg. In this the fingers were not capable of active movements but were adjustable. It permitted great grasping power. All the finger joints

were movable and the fingers were held in extension by flat springs. When forcibly flexed the fingers remained in that position until released by pressure on a projected button at the wrist. A Berlin dentist named Peter Baliff produced a mechanical hand in 1818. In this the normal position of the fingers was flexion, which was maintained by special springs and extension through catgut cords worked by the action of the sound shoulder with straps around the chest. The weak point in this device was the weakness of grasp. The principle was developed by Karoline Eichler, but in the hand made by her the fingers are in extension, maintained by spiral springs. Flexion is brought about by means of catgut cords worked by the sound shoulder.

The Keller hand for forearm amputations has been extremely popular in Germany. It has three stiff metal claws and is used in conjunction with a strap.

The arm of Lange is an interchangeable work and Sunday arm. This is attached to a leather cap, closely modeled on the shoulder girdle, or, in upper arm cases, a leather ring around the shoulders with steel strips attached to it.

The important points in an upper arm prothesis are: Accurate adjustment and fixation to the trunk; (2) great simplicity of construction; (3) solid material is required.

The Carnes hand has been used by Dr. Max Cohn even for operating.

Lange describes two kinds of hands, one for finger-tip grip, the other for the broad or palmar grip.

Adequate arm prothesis is much more difficult of attainment than the production of a suitable artificial lower limb. This absence of cutaneous sensation in the hand may be atoned for in a measure by the development of the muscular sense of the stump muscles. The artificial hand to be useful should form a fist for grasping purposes; the hand should utilize the sense of touch, or at least the muscle sense.

The artificial arm should be wholly independent of the function of the muscles of the sound limb. No artificial arm has any great value unless it permits a man to pursue his daily life and work. Among the signs of a good artificial arm are the following: (1) Power of flexion and extension at the elbow; (2) rotation around the long axis of the upper arm; (3) pronation and supination, flexion, and extension at the wrist.

For an arm to be useful there must be free movements of the shoulder.

Maintenance of the free movements of the shoulder is a *sine qua non* of a useful arm.

Of the short muscles all except the opponens pollicis can be sacrificed.

In musculo spiral palsy the fist can not be closed while the wrist is flexed.

"For hard work it has been well said, 'The stump is the best prothesis.' The mechanism of the hand is wonderful, but skill in its use depends more on the cerebral cortex. The stump has sensation, which plays an enormously important rôle in the mechanism of the hand. Not only is there cutaneous sensibility, but muscular sense and pressure sense. Sensibility can be developed in use and touch corpuscles increased in number, so that after a year or two the stump may be as sensitive as the finger-tips, but this will happen only if the stump is continually uncovered and exposed to fresh air, so that it is not coddled, but hardened and strongly vascularized."

The following directions are given for making Martin's Waterproof Glue:

Dissolve in a water bath (or the ordinary gluepot) 1 kilogram (35 ounces) of the best glue in 1 liter (1¾ pints) of water. When the solution is homogeneous precipitate it by adding the following solution of tannic acid: Acid tannic, 2,500 grams, say, 5 pounds; acid carbolic, 500 grams, say, 1 pound; water, 50,000 grams, say, 10 gallons.

Add this solution to the glue until it becomes a milky white throughout.

Let it cool down to 35 C. (95 F.).

Collect the precipitate then produced and wash it thoroughly in tepid running water at about 30 C. (86 F.) until the washing water is only very slightly discolored by the addition of a dram or two of an aqueous solution of sulphate of iron of a strength of 10 per cent.

The stringy precipitate should be leathery and of a pale mauve color. It becomes rather brittle when cold.

Take this precipitate and make it soft again in the water bath.

Dissolve it at a temperature of 80° to 90 C. (176° to 194 F.) in dilute alcohol (alcohol as used for burning or ethyl alcohol of 90°, 1 part to 3 parts of distilled water). Dilute till it has a sirup-like consistence when cold; it coagulates while becoming paler in tint.

Before using the solution bring it to the boil, which occurs at about 80 C. (176 F.).

This glue is used hot, and it should remain of a constant consistency.

As soon as it becomes in the air the color of dark-brown caramel, and remains so, it must be restored to the proper tint by the addition of a certain quantity of dilute alcohol.

Dr. Martin uses a table or trough kept at a constant temperatu by a current of hot water. The vessels containing the glue in u are stood in this running water. The glue is applied with a brus and the adherence of the strips of wood is secured by pressure wit a hot copper roller.

Cramer states that bony spurs, either from periostium or medull are rare in the upper part of the tibia but they are almost the ru in the femur. The arch of the sound foot must receive close a tention in case of amputation of the lower extremity, because of th additional strain put upon it after long confinement to bed. Th effects may be disguised but the disposition of the patient to thro the weight on the outer side of the foot, raise the border and so in advertently conceal a flat foot. The following are the stumps th need operative interference: (1) stumps with sinuses, which usuall go down to dead or an infected ligature; (2) stumps with abunda skin; (3) stumps with little or no skin covering; (4) stumps whic can not bear pressure because skin over them is too tender.

Preliminary to reamputation there must be weight extension ap plied to the skin during a period of nearly 3 weeks but never fo longer.

In doing reamputation it is essential to leave no bleeding point untied.

The most difficult stumps to handle are the short ones with pro jecting point ends. One has to try to cover them, sometimes by sac rificing more bone, sometimes by using pedicled flaps. Stumps o the upper arm are easier to close over than those of the thigh.

In Volume 1, No. 7 (July 1, 1918) there is a review of WEDERHAKE, The surgi cal use of human fat. Berl. klin. Wchnschr., 1918, 55, 47.

Wederhake reports on the surgical uses of human fat, which h always obtained from the living body, either from the omentum o from lipomata. After due preparation and sterilization it is in a liquid state. Before use it is heated to body temperature. The author employed it with advantage in the following groups of cases:

(1) By way of hypodermic injections to raise depressed and de tach adherent scars.

(2) In connection with suture of tendons.

(3) By injection into the sheaths in case of tendovaginitis *crepi*tans.

(4) By injection into the sheaths of the flexors in Dupuytren's contraction. The author claims that no other mode of treatment brings about reliable results in so short a time.

(5) In traumatic oedema, the most important field for the use of human fat, since here it shows in a preeminent degree its striking capacity for *dissolving scar tissue.*

(6) In dealing with the after effects of phlegmonous tendovaginitis.

(7) For padding the skin over bony prominences. Thus it proved useful in a case in which the plantar fat of the heel had completely disappeared from trophic lesion.

(8) For filling vein grafts used for bridging defects in the continuity of a nerve.

(9) By hypodermic injection in pruritus ani et vulvæ.

(10) For detaching nerve adhesions.

(11) As a dressing for wounds. But it does not supply an ointment base.

Its chief value, however, lies in the fact that it dissolves cicatricial material, chiefly in conection with the sheaths of tendons. It is superior in this respect to thiosinamin, fibrolysin, and cholin; but its effects are purely local.

MARTINI, E. München. Med. Wchnschr., 1918, 65, 404,

recommends the use of the following epilatory powder in the prophylaxis of typhus; Two parts of strontium sulphate and one part each of zinc oxide and talc. The powder is made into a paste with water and applied to the hairy parts of the trunk and limbs; the crust is removed in about 10 minutes. The patient is then washed all over, and the skin, especially of the scrotum and anal region, greased with oil or vaseline. The paste is not applied to the face or head, the hair of which is carefully shaved. The patient's clothes are in the meanwhile deloused in another room. This epilatory method is applied to all typhus patients, to those suspected to have the disease, and to those known to have been exposed to infection. During the last 18 months this routine has been in vogue at the Wloclawek fever hospital and none of the staff, the male and female nurses, or the washerwomen have contracted typhus.

Transfusion with the blood obtained from convalescent patients is described by KADELEK, J. Wien. klin. Wchnschr., 1918, 31, 47–50,

as very simple and not necessitating centrifugalization or delay to allow the blood to clot. Whole blood is employed and it is considered that this is more likely to be sterile than the serum. It is doubtful if the red cells and the platelets exert any specially beneficial influence, but the leucocytes certainly do. The technique is free from

complicated steps; the syringe is washed through with a 4 per cent solution of sodium citrate in normal saline, and an amount equal to one-tenth of the blood to be withdrawn is retained, for example, 2 cc. when 20 cc. of blood, the smallest quantity of blood that has any effect, are to be taken. The blood is then withdrawn from the vein at the elbow of the convalescent patient, mixed with the citrate solution already in the syringe, and injected into the febrile patient. The earlier in the course of the disease the transfusion was given the better the results. If given before the rash appeared, a prompt and permanent fall of temperature resulted; when administered later, the recovery was not so rapid, but the course of the disease is shortened and the symptoms alleviated. No bad results were observed.

Daily Review of Foreign Press, July, 1918, points out that psoriasis is now less severe in type in Germany, owing to the reduction of meat and the increase of milk and vegetables in the general diet.

Scabies is a serious scourge among French troops, as under war conditions vexatious complications are numerous and common. These are persistent ulcers, boils, superficial phlebitis.

MILIAN, G., in Paris Médicale,

recommends the use of an insoluble sulphur preparation whereby the treatment is simplified and abbreviated. The ointment is made by mixing vaseline and lanoline, 250 grams of each, to which is added first a solution of sulphide of potassium in 250 grams of water, and then oxide of zinc (5 grams) in 200 grams of liquid vaseline. After a bath or wash with soap and water this ointment is applied all over the body, and the patient puts on his clothes; the next day the process is repeated, and on the following day a bath with soaping is given to remove entirely the slightly irritating ointment. Scabies with impetigo and boils can thus be treated, and the need for disinfection of the clothes is done away with. Two further points, however, should be mentioned. In the first place, the objective signs of scabies often become more prominent for three or four days after the ointment has been applied, thus burrows previously invisible become evident; and, in the second place, persons with susceptible skins or those who have not been thoroughly washed with soap after the second application of the ointment may have a more or less widespread acute nonsuppurative folliculitis which appears, in about 2 per cent of the cases, four or five days after the use of the ointment, and lasts for five or six days. These red papules, due to the irritation of the remains of the ointment, must not be mistaken for a relapse of the scabies.

HYGIENE.

SMITH, C. E., and SCHOBERG, H. M. **Sanitation of swimming pools.** Am. Jour. Pub. Health, June, 1918.

The diseases likely to be acquired by bathing in polluted water fall into three groups: Intestinal diseases, those of eye and ear, and venereal. Typhoid fever and dysentery have been contracted through the ingestion of polluted river water by bathers. Trachoma and ear infections have been reported following the use of swimming pools. Cases of gonorrhea and infections of the vagina by the bacillus prodigiosus following use of public baths have been reported. The greatest menace to health is represented by the B. coli communis and the B. typhosus.

Management of the water.—There is no direct relationship between number of weekly fillings and sanitary condition of the water in a swimming pool. Dilution is expensive and efficient. Refiltration improves general appearance of the water, lowers bacterial content of swimming-pool water, and reduces cost of maintenance.

Chemical disinfection.—Copper sulphate destroys bacteria and algæ. From 0.04 parts of copper sulphate per million of water used each day to 0.5 parts per million is recommended. The effects of blue vitriol taken internally in small doses frequently repeated has not been determined, but in concentrated form it is poisonous, hence the need of great care in its employment for purposes of disinfection. Calcium hypochlorite is an effective germicide through the liberation of chlorine. Tully recommends 0.5 parts hypochlorite of calcium (30 p. c. available chlorine) per million. Others believe that as much as 3 parts per million are necessary. This subject is still under investigation. The amount of bleach required depends in part on the hardness of the water. At this writing the chemical is costly, and it may be cheaper to use liquid chlorine. Chlorine being irritating to mucous membranes is unpopular with the patrons of swimming pools.

Administration has much to do with keeping the bacterial count low. Bathers should be instructed in swimming-pool sanitation and should be inspected before entering the water. They should have a cleansing with soap and hot water preliminary to entering the pool.

General conclusions.—Swimming pools should be so well lighted that a submerged person can always be readily seen. Economy therefore suggests locating the pool at the top of a building. The waste water from the pool can then be used for flushing of closets, urinals, etc., in the building. The sides of tank should be smooth. Four sides of the pool should be available for use with life rails all around. Overflow gutters are necessary, and there should be a trip basin 12 inches below the main platform. When the tank is emptied

the sides should be scraped, scrubbed, and flushed, then steamed, aired, and dried. Wreaths of sediment on the floor should be removed and pumps on the general plan of a vacuum cleaner are recommended. Refiltration and constant agitation of the water should prevent formation of wreaths. The water selected for the pool should be the cleanest available and not that whose source is simply the most accessible.

Constant refiltration makes it possible to use a given filling a greater length of time. This is an important item in cost of maintenance and will more than compensate for the initial cost of the equipment. The tendency toward installing a plant of too small capacity should be avoided. It should be possible to refilter all the water in the tank in one day (eight-hour days are in vogue). Usual frequent attention should be given to reversal of filters, washing, and steaming.

Dilution should be practiced sufficiently to make up the loss by splashing, etc. No definite amount can be stated. This should depend on the number of bathers, frequency of refilling, etc. As a rough working rule it is suggested that the dilution be sufficient to amount to one filling between refillings.

Refillings should be determined by the number of bathers, size of pool, and bacterial content, as there is no direct relationship between the number of weekly refillings and the sanitary condition of water. The general appearance of the water counts for nothing.

Chemical disinfection is imperative.—Both calcium hypochlorite and copper sulphate have advantages—the latter probably being the favorite. Either should be used in strengths increasing from 0.1 parts to the million of water, depending on the size of the pool, number of bathers, the hardness of the water, and the bacterial reduction obtained. Bleach must be tested frequently for available chlorine. It quickly disappears from the pool.

Supervision of bathers.—Full shower bath with soap should be demanded of all bathers. To make this possible the shower apparatus must be inspected very frequently. Instruction should be given bathers in the purpose of the bath. Especial attention should be given the perineal region. When water strikes a person's body the natural tendency is to urinate. This should occur in the shower, not in the pool. The floor should be taken care of to prevent tracking the dirt, bacteria, etc., which have been washed off by the shower, onto the deck about the pool. On the pool platform inspection of every entrant should be performed. Bathers should wear no clothes. If this be impracticable the authorities of the pool should furnish the suits—one-piece, undyed, scanty—and see that they are properly sterilized and dried between usings.

PATHOLOGY, BACTERIOLOGY AND ANIMAL PARASITOLOGY.

Eberson, F. A bacteriological study of the diphtheroid organisms, with special reference to Hodgkin's disease. Jour. Infect. Dis., July, 1918.

The writer has given an excellent historical review of the diphtheroids. He states the difficulties in classification and suggests that they be placed in nine groups, under the term "Corynebacteria."

He realizes that his classification is far from being complete.

Agglutination and complement fixation tests were carried out to determine the identity of strains isolated from Hodgkin's disease. Sera from four patients having Hodgkin's disease failed to cause agglutination of eleven strains of bacteria, eight of which had been isolated from glands in cases of Hodgkin's disease and three from (1) a case of leukemia, (2) ascitic fluid in cirrhosis, and (3) blood.

Complement fixation tests led to the conclusion that the cause of Hodgkin's disease is not the organism described by numerous workers, and that cultural characteristics did not serve to differentiate the supposed cause of Hodgkin's disease from numerous saprophytic diphtheroids.

The following table has been prepared from his tentative classification:

Diphtheroids (Eberson), Gram positive, nonspore forming, nonmotile, no liquefaction of gelatin (except C. Putidum).

Group.	Name of organism.	Dextrose.	Maltose.	Saccharose.	Dextrin.	Lactose.	Mannite.	Raffinose.	Aerobic=A.	Anaerobis=AN.	Virulence.	Isolated from—	Remarks.
1	C. Diphtheria	+	+	−	+	....	....	....	A	.....	+	.....	Polar bodies, toxin products.
1	C. Pseudodiphtheriae sp. nov.	+	+	−	+	....	....	....	A	.....	−	Tonsils	No toxin produced.
2	C. Pseudodiphtheriticum	−	−	−	−	....	....	....	A	.....	−	.....	Short and thick; broth cloudy.
2	C. Ceruminis	−	−	−	−	....	....	....	A	.....	−	Normal ear	Broth clear with sediment.
2	C. Delicatum sp. nov	±	±	−	−	....	....	....	....	AN	−	Ascitic fluid blood cult	Small and delicate.
3	C. Xerosis	+	+	+	−	....	....	....	A	.....	....	Eye	Delicate growth.
3	C. Epidermidis sp. nov	+	+	....	....	....	....	....	A	AN	−	Skin pus pockets	Small, ovoid.
3	C. Suppuratum sp. nov	+	+	±	....	....	....	....	A	.....	−	Pus pockets, abscesses	Heavy; glistening growth.
3	A. Auris	+	+	−	....	....	....	....	....	.....	±	Ear	Long; scanty growth.
3	C. Cerebralis sp. nov	+	+	....	....	+	....	....	....	.....	−	Brain	Ovoid, coccoid.
4	C. Nodosum	+	+	+	+	....	....	....	....	.....	−	Urine	White growth on agar.
4	C. Acidum sp. nov	+	+	+	+	+	+	−	A	.....	−	Urine	Do.
4	C. Ascites sp. nov	+	+	+	+	−	+	....	....	.....	−	Ascitic fluid	Many club-shaped forms.
4	C. Flocculens sp. nov	+	+	+	+	+	−	....	....	.....	....	Appendix	No cloud; Neisser's granules; flocculent sediment.
5	C. Hoagii	+	−	+	....	....	....	....	....	.....	....	.....	Abundant but imperfect granules, salmon-colored in serum.
5	C. Aurantiacum sp. nov	+	+	....	....	....	....	....	A	AN	....	.....	Coccoid; orange pigment.
5	C. Glandulae sp. nov	+	+	+	±	....	....	....	....	.....	....	Hodgkin's disease	Ovoid and coccoid; col. dry and heaped up.
5	C. Striatum	+	+	−	....	....	....	....	....	.....	....	Nasal mucus	Large, irregular granules; thick bars.
5	C. Segmentosum nom. nov.	+	....	....	....	....	....	....	....	.....	−	.....do	Polar bodies.
6	C. Putidum sp. nov	−	−	−	−	−	−	−	A	AN	....	Ascitic fluid	Offensive odor; liquefies gelatin.

7	C. Typhi-exanthematici	+	+					AN	+	Typhus fever	Acid in inulin and galactose pleomorphic.
7	C. Acnes	++	++	+				AN	+	Pustules (deep)	Acid in inulin.
8	C. Pseudotuberculosis	++	++			+	±	A	+	Animals	Toxin produced golden pigment.
8	C. Pyogenes	−						A	±		Hemoglobinophilic.
8	C. Vaccinae							A		Vaccine pustules in calves	Yellow pigment.
9	C. Lymphophilus	+						AN	−	Hodgkin's disease	Slender; pleomorphic.

[G. F. C.]

NOGUCHI, H. **The spirochetal flora of the normal male genitalia.** Jour. Exper. Med., June 1, 1918.

On account of the reports by Martin, Nankivell and Sundell, and by Patterson of the presence of spirochaetes in urine in cases of trench fever or "P. U. O." (Pyrexia of unknown origin), Noguchi has studied the spirochetal flora of the normal male genitalia. His discussion and summary is as follows:

The varieties of spirochetes enumerated and photomicrographed from the male smegma flora represent practically every form hitherto described by Nankivell and Sundell and by Patterson in the specimens of urine from trench fever cases. The urethral flora, as studied by Stoddard, seem to contain more varieties, but, except those of his more detailed morphological descriptions every form observed by him is among those found in the smegma. Stoddard saw certain forms with hooked ends suggestive of the Leptospira icterohaemorrhagica of infective jaundice, but the resemblance ends with this one feature and differentiation should always be possible under the dark-field microscope by means of which the leptospira reveals its highly characteristic minute elementary spirals, presenting the appearance of a chain of dots. . . . . Of all the spirochetes, none has so closely set spirals as the jaundice leptospira, the distance between two spirals being only 0.5 microns. Various methods, including Fontana's, Benains's, the mordant gentian violet stain, or Burri's india-ink method, are inadequate to differentiate the leptospira from other spirochetes.

Why a positive spirochete finding with the films from the urethra and the specimens of urine was not obtained is difficult to explain, except on the ground of the paucity of specimens examined. At all events, the recent negative results reported by Flessinger with French soldiers and invalids after cleansing of the urethra and glans seem to be in harmony with my results.

In conclusion it may be stated that Spironema refrigens, Treponema calligyrum, and Treponema minutum represent practically all the spirochetal forms observed in the male smegma flora. A leptospira has never been conclusively shown to be present in the specimens of normal urine or smegma. For the satisfactory microscopic demonstration of a leptospira a dark-field illuminator is indispensable. [G. F. C.]

MILITARY, LEGAL AND INDUSTRIAL.

MILLS, C. K. **Notes on the influence of wars and the phychology of the times.** Am. Jour. Insanity. Vol. 74, No. 4. April, 1918.

Since the beginning of the present war and especially since the country has become involved in the conflict, every one, of course, has been interested in arriving at the truth relative to its definite causative factors. To arrive at a conclusion on that point it is necessary for us to go back and study the factors involved in other wars, the effect of those wars on the times, and to fully understand the national, as well as the international, psychology of the present. These things the author presents to us in a very instructive and interesting way and for that reason the article is well worth careful perusal. We are reminded that in times of peace people are very liable to be

sight of the higher ideals, become self-centered, and indulge in excesses of all kinds. In times of war the heroic qualities of the people are developed; they become as a rule, self-sacrificing, and having a desire to be of some assistance to their relatives who are on either side they do all manner of things, involving manual labor. It is not uncommon in times of war to see individuals actively engaged in all forms of war work, who had formerly lived what might be termed parasitic existences. Wars may be traced to the influence of former wars. The emotions and sentiments of the people at one period of conflict become more or less crystalized in their psychology, and later, under the influence of a variety of solvents they are set free again to become active. This can be well illustrated by the strife which began in England in 1643 against the tyranny of the King. These efforts passed down to the American and French revolutions. At the beginning of this war Germany believed that defeat was impossible, but now there are evidences that the psychology of that country is changing and the people are beginning to realize that her foes may be unconquerable. England was more self-complacent, rather than self-idolatrous, her energies having been expended along the lines of commerce and social development. The American was apparently entirely interested in accumulating great wealth, and in so doing he lost sight of many of the desirable ideals and believed, for some reason, that the possibility of this country being involved in the war was very remote, because of the fact that 3,000 miles separated it from Europe. A poor understanding of international psychology resulted in the unpreparedness in England, as well as in America, and so the present conflict is being prolonged many years. If the allied nations had been fully prepared there is no question that the war would probably have been over by this time. In conclusion, the author refers to the possibility of international peace by agreement, and is of the opinion that there will be no such thing unless all parties to the agreement are individually strong enough to support what they consider to be their rights by force. [D. G. S.]

BRILL, A. A. The adjustment of the Jew to the American environment. Mental Hygiene. Vol. 2. No. 2. April, 1918.

Since the entrance of the United States into the world conflict, and the accompanying increase in the Army and Navy, it has been noted that there has been a proportionate increase in the incidence of mental disorders of functional type. A very high percentage of these cases have been in individuals of Jewish extraction, the patients as a rule recovering when the service conditions of stress and discipline have been removed. To be of assistance to these patients it is, of course, desirable to have an insight into the character and emotional make-up of the race, its normal conflicts and its reactions, so

that any illness developing in a man may be discovered in its incipiency and possibly kept from actually assuming the aspects of a definite psychosis. The general features, as outlined above, are wonderfully expressed by the author of the article, and it is recommended for careful study by all medical officers of the Navy. Aside from the professional value of the article it is interesting from the psycholcgical standpoint and contains valuable information which every American in an executive position should be familiar with. The physicians specializing in mental conditions have realized for years that the Jews, as a race, usually evidence functional mental derangements, almost to the exclusion of organic brain lesions and the senile conditions found in the non-Jew. Because of conflicts through which the Jewish race has gone in the past centuries, as a result of the treatment of other peoples and nations, the Jew, as an individual, is now realized to be oversensitive and inclined to repress the greater number of his difficulties. As a result, when repression is not successful, a psychosis develops usually of functional type. There have been two definite psychological factors involved in the emotional make-up of the Jew that we see to-day. The first is a reaction which has come as a result of religious conditions which have made it necessary for him to develop along very narrow lines. It is therefore difficult for him to adjust to outside life, he is a poor competitor for existence, aside from financial and business matters, is usually coddled and spoiled, self-willed and egotistical. Because of the actions of the non-Jews with whom he comes into contact, he, as a rule, represses his emotions and becomes an isolated individual. His feelings, his desires, and his ideals are not understood by those with whom he is thrown, and because of his inability to meet the difficult problems in an outward manner he apparently prefers to remain by himself. The second factor is said to be the family situation, where all of the patient's love, affection, and interest is centered in the home. He is not allowed to select his own mate; he is suspicious and fearful of outsiders, is a poor mixer, and as a result when he gets into a difficult situation, given added responsibility, and required to use initiative, he, as a rule, develops a paranoid reaction. It is not uncommon to see this reaction in officers of the Naval Reserve Corps who are pushed into difficult situations, having left a home of ease where their every want had been supplied by the parents. They usually develop ideas of reference, feel that the people about them are not showing proper respect, and a little later on, if this tendency is allowed to develop, they will feel that some definite action is being taken against them by their associates.

[D. G. S.]

ARMSTRONG-JONES, R. **Notes on drink and its regulation in relation to work and health of Great Britain.** Am. Jour. Insanity. Vol. 74, No. 4. April, 1918.

The question of prohibition and allied suggestions have been constantly before the public in this country in a political and social way for a number of years, but no effort had been made for a Government regulation of liquor traffic until the onset of the present war. Since that time there has been a regulation by the Army and Navy, in the vicinity of cantonments, naval bases, etc., in the form of absolute prohibition. Great Britain decided to arrive at the same destination by regulation of liquor through a board of central control, which was instituted by an act of Parliament in June, 1915. This board was authorized to not only regulate liquor control, but to maintain the efficiency of the workers in various areas. All of Great Britain was included, with the exception of Ireland, which has less than one-twentieth of the population of the whole. In most cases this board owned and controlled the licensed premises, established canteens, eating houses, regulated the hours the various establishments were to be kept open, legalized the sale of spirits and beer of a lower strength than formerly made, and made very definite efforts to lower incidents of drunkenness, especially at week ends. It also abolished the sale of intoxicating liquors in bottles from grocers and other places, so that the intoxicant could not be conveniently carried away for consumption later.

The canteens and eating houses were tastefully decorated, the proprietors of these establishments were paid on a commission basis, the larger rate of commission being allowed on edibles and none on intoxicating liquors. As a result the efficiency of the workmen, soldiers, sailors, etc., was raised to a great degree, there was less drunkenness, and at the same time the laboring class apparently made no objection to the procedures as outlined. The success of the board's efforts was apparently very marked and the medical profession of Great Britain is very much elated over the outcome.

[D. G. S.]

HAMILTON, A. **Effect of the air hammer on the hands of stonecutters.** Monthly Review, U. S. Bur. Lab. Statistics, April, 1918.

Dr. Alice Hamilton has investigated a curious condition in the hands of stonecutters which seems to follow the use of the air hammer in cutting and carving stone, and which is found among the limestone workers of Indiana, the granite cutters of Massachusetts and Vermont, the marble workers of Long Island City, and the workers in the sandstone mills of northern Ohio.

The pneumatic hammer employed consists of a handle containing the hammer, which is driven by compressed air and is said to deliver

from 3,000 to 3,500 strokes per minute. There are various ways of holding the handle in the right hand while the chisel is held by the left hand against the hammer with the cutting edge pressed against the stone. With the exception of the workers in the marble shops in Long Island City all the workmen seen by Dr. Hamilton were without any adequate means of conveniently warming their hands in the winter.

A description of one or two of the more marked cases of anemia in the fingers will show just what this condition is. The first one is a limestone cutter whom I saw early in the morning when the temperature was about 14 F. He had been out of doors for over half an hour, and in order to be able to show me his hands in a typical condition he had refrained from rubbing them violently and swinging his arms about, as he would ordinarily do to restore the circulation. The discomfort, however, had grown so intense in his fingers that he could not bear it any longer and almost at once after I arrived he began rubbing and kneading and shaking his hands. The four fingers of his left hand were a dead greenish white and were shrunken, quite like the hand of a corpse. The whiteness involved all the little finger to the knuckle, but in the other fingers it stopped midway between knuckle and second joint. As he rubbed his hand the contrast between fingers and hand increased and at one stage it was very striking, the crimson and slightly swollen hand meeting the white, shrunken fingers abruptly, without any intermediate zone. On the palmar side the condition was not so distinct, for the skin was too thick and calloused to allow the color to show well.

The right hand was much less affected, the little finger escaped altogether, the three others were white, but not dead white, as far as the second joints, and there was a ring of white around the second phalanx of the thumb. After vigorous massage and beating of his arms back and forth over his chest the blood gradually filled the fingers and the appearance then was fairly normal, showing only a moderately purplish-red color, and no swelling.

These stonecutters are exceptionally good material for such a study, for they are intelligent men, usually of good education, and able to note and describe their symptoms clearly. There is among some of them a tendency to dwell, perhaps too much, on the nervous disorders which they believe are caused by the tiring vibrations of the hammer, and which give them a good deal of worry. Of nearly all of the men, however, this is not true. Many of them have no complaint at all, except of the actual condition in the hands, but others suffer from more or less distressing symptoms which they think are caused by the vibrating hammer. The most common symptom is covered by that vague term "nervousness." They say that they feel jumpy and irritable, upset by a slamming door, unable to settle down after a full day's work with the tool. Their sleep is disturbed and restless, and they have buzzing or ringing in the ears. The numbness in the hands is inconvenient, for they can not hold a newspaper or a book for any length of time without being forced to put it down and rub and knead their hands. Sometimes they have to sleep with the left arm hanging down from the bed, or the numbness will waken them, and then they must get up and swing the arms about or bathe the hands in hot water. Some of them are not troubled at all in summer, others get numb fingers on chilly days, or if they put their hands in cold water. A few men complain of trouble with the left foot, which is colder than the right.

There are several reasons why the left hand is more affected than the right. In the first place a greater effort must be made by the left hand in grasping

the tool, holding one end against the hammer, and guiding and pressing the other end along the surface of the stone. The fingers often clasp the tool so tightly that the blood is driven from them, and this, together with the vibration of the tool from the blows of the hammer and the influence of the cold, seems to set up a condition in the blood vessels which leads to spasmodic contractions and the resulting blanched and shrunken condition. The right hand can hold the larger hammer more loosely and can shift it in different ways during work, and the vibrations are not felt so severely as in the left hand.

Some men continue to be liable to attacks of white fingers even after they have given up stonecutting for several years.

There were altogether 123 workmen in the three branches of soft stone, marble, and granite work whom I examined, and I found only 17 who had not had the so-called "dead fingers." If we omit those who sought me out in order to show me their hands and who might be looked upon as picked cases, there remain 102 whom I saw in the mills and who were not selected at all, but taken as they came. Only 16 of these were quite free from the trouble.

Dr. Hamilton describes the condition as a spastic anemia dependent on three factors, (1) long continued muscular contraction of the fingers, (2) mechanical vibrations of the tool, (3) the cold.

HOOKER, E. H. **Criticism of venereal prophylaxis.** Social Hygiene, April, 1918.

The writer takes an article by Medical Inspector Charles E. Riggs, United States Navy, which appeared in Social Hygiene for July, 1917, and was only an elaboration of the article which appeared in the NAVAL MEDICAL BULLETIN for January, 1917, as a text for an attack on venereal prophylaxis. The author's contentions seem to be that prophylaxis is not sufficiently effective and can not be owing to the inherent difficulties attending prompt administration; that the Government attitude toward continence, venereal diseases, etc., is not what it should be; that repression of prostitution depends ultimately for its success upon the cooperation of men in the service; that "continence should be considered by the practical man, not on the ground of morals" but because regulation has failed. The essayist gives as her final argument against prophylaxis: "It is an effort on the part of the Government to make it safe for men to satisfy their sexual passions without regard to the primary purpose of sex."

In the beginning of her paper the essayist seems to concede that the "practical impossibility" of a measure makes it of "at least debatable value," and we rather think that this thought should have considerable weight before it is expected of an overworked parental Government that it shall forcibly put a stop to fornication. We may be wrong, but we infer that the writer for Social Hygiene expects the Government to penalize the men "by lack of pay or refusal of leave for having had illicit intercourse." She admits indirectly that a good many men would escape punishment by not confessing to their sin, but makes no suggestion as to how the offend-

ers could be detected. One is reminded of the fable of the mice wishing to bell the cat, a plan excellent in theory but characterized by "practical impossibility" of execution. One recalls, too, the chastity belts of the middle ages and a more extended historical retrospect suggests that punishment has never yet proved efficacious as a means of preventing sin.

It seems to the reviewer unfair to charge the Government with "connivance" at male incontinence, to accuse the Government of officially tolerating male prostitution, and to say that the men infer "from this attitude on the part of Government that promiscuous intercourse is permissible" and direct their conduct accordingly.

"Government" is a term of sufficient vagueness to permit of all sorts of attacks and much vilification with impunity to the critic, but this same vagueness makes it rather difficult to speak accurately of the "Government's attitude." If by the "Government's attitude" the essayist is speaking of the Army policy, that is one thing; the attitude of the Navy Department may be somewhat different; Congress may have an attitude all its own. It seems to at least one reader of E. H. Hooker's article as though the author held that in some way or other Bachmann and Riggs and the Government and Napoleon and physicians generally are banded together in a hypocritical sort of way to condone incontinence in men. While *not* prepared to take up the cudgels for Government, we can not admit that when Congress passed a law which mulcted men of the Army and Navy of their pay while carried on the sick list for venereal disease characterized as due to their "own misconduct," it was condoning incontinence. The law now in force recognizes the medical fact that venereal disease may be innocently acquired, and the victims of venereal disease so acquired are not punished. There is no escape, therefore, from the conclusion that the intention was not to punish the victim of venereal disease but the person guilty of illicit sexual intercourse, whose sin is disclosed by his physical affliction. In practice the law amounts to a punishment for contracting venereal disease, but it was doubtless intended to punish illicit intercourse, or at any rate it is the nearest approach to doing so. At least it was proposed not to spend public funds on pay to men disqualified from performing their duty by acts of misconduct on their part.

We have seen the innocent child blind from birth owing to gonorrhea of the mother. We have seen the beloved mother and devoted wife suffering an amputation of the leg for supposed tuberculosis when the real disease was congenital syphilis acquired through the sin of a parent. We have seen the young bride of a week writhe in pain from an acute vaginitis and proctitis acquired from her husband, and we have no sympathy with the dispassionate moralist who can stand coldly aside and permit child, mother, or

bride to be be made the unwitting victim of a disease that can in many cases—alas, not in all—be prevented by physical means; who refuses such physical prevention of suffering because a far better, a more ideal, a worthier prevention would be that due to moral agencies.

If men are hardly prevented from improper conduct by a full knowledge of the punishment which nature herself imposes and a knowledge of the punishment superadded by the authorities, we are at a loss to know what punitive measures are still within the power of the authorities. One doubts if the essayist is really familiar with the history of prophylaxis in the United States Navy and of the attitude of the "authorities" which "govern" it. As E. H. Hooker is not alone in her ignorance on this subject, it is briefly rehearsed here.

Prophylaxis in the Navy began to be employed on a considerable scale some 16 years ago and was first conspicuous on the China station, where, owing to conditions ashore, the prevalence of venereal disease in the personnel of our ships reached a startling magnitude. It began as a purely medical and sanitary measure, and the results to health promptly recommended it to the military authorities. Prophylaxis then became more or less general throughout the Navy, but its administration has always varied widely according to the views of individual commanding officers of ships and fleets. In home waters the moral aspect of prophylaxis soon obtruded itself into the problem and moral and ethical considerations soon made it "practically impossible" to administer prophylaxis in a thoroughgoing manner.

Meanwhile changes in the internal economy of ships and stations also contributed to the decline of prophylaxis. As periods of liberty and furlough were increased and lengthened the possibility of prompt and efficient prophylaxis was much reduced. Coincidently with these changes and the frank failure of prophylaxis in many cases, due largely to indifference on the part of the men, in spite of court-martials and fines for failure to take prophylaxis, a large proportion of the medical officers of the Navy realized the necessity for enlarging the scope of prophylaxis so as to include more instruction on veneral disease, and on the importance and value of continence.

It is hard to realize that any portion of the American public is still unaware of the very pronounced and outspoken attitude of the present head of the Navy Department on this subject. The Honorable Secretary of the Navy has more than once given public expression to his convictions and no officer or man in the service to-day can be in the full possession of his mental faculties if he claims that the government of the Navy sympathizes with, condones, or connives at sexual impurity.

Prophylaxis in the Navy to-day is a good deal more than the administration after coitus of an injection or salve. There has been for some time a concentrated and strenuous effort on the part of the medical officers of the Navy to impart to officers and men of the service such information regarding health and disease and such conceptions of life, worthy effort and true success as shall build up in the man a power of inhibition far superior as a deterrent from sin, to the fear of punishment. In the instruction given to-day the physical agents like calomel ointment, and solutions of the silver salts are mentioned as the last resort in the attempt to maintain efficiency, and the subject is so handled that it is as unfair to speak of medical preventives of venereal disease as incentives to immorality as it would be to pronounce the Savior's atonement and saving grace a warrant for sin.

The author has gracefully conceded to Dr. Riggs a "fine sincerity" and the possible ability to "give fair consideration to a point of view opposite his own." The point of view is everything. For one person the point of view may be the quiet study room, with suggestions of refinement and culture in books, paintings, and furniture. The world is viewed through mullioned windows. The glance is to the far horizon and the clear dawn of a better era. There are others, "intelligent medical men," for instance, who have neither the time nor the type of mentality for casuistry, academic discussions, and fine theoretical distinctions. In the heat and burden of the day they find themselves jostled and pushed about by the struggling, sweating mass of humanity that goes faltering and staggering along the rough road of life, now fainting, now falling, by the wayside. To those thus plunged amid their fellow men, knowing them, pitying them, sympathizing with them, one form of duty appeals with special force. It is the duty to bind up wounds and to heal bruises; to reduce by every means in their power the sum total of human suffering and sorrow. To the glory of the medical profession be it said that its members have never stood aside like the Pharisee or the Puritan speculating on the moral quality of the needy or demanding vouchers of respectability from those in pain.

For the honest and upright physician of to-day who is well informed about the ravages of venereal disease and the toll they take from innocent women and children, there is but one course open. He must warn and exhort every man that he has any chance of influencing; he must do everything in his power to deter that man from vice, but when his books, his tracts, his speeches, his private talks, his illustrated lectures, his posters, his moving pictures, his pleadings, and his prayers have all failed to deter him from vice and cohabitation with a harlot, it remains the doctor's duty to try to prevent the development of syphilis and of gonorrhea in that man,

because every case of venereal disease is a potential infector of innocent women and children; because from one case of gonorrhea may come indirectly hundreds of other cases and cases of peritonitis and sterility and an interminable list of ills; because a single case of syphilis may directly or indirectly lead to hundreds of other cases, to locomotor ataxia, to dementia præcox, and an interminable list of ills.

We take so cold and material a view of life and its facts through association with men and women of all types, clean and unclean, that we believe evil practices and physical disabilities form a vicious circle. Immorality induces venereal disease, and venereal disease indirectly causes immorality, because gonorrhea and syphilis mean loss of time, loss of pay, hunger, discouragement, the craving for liquor, or drugs to dispel that discouragement. Children born of alcoholic or starving parents, of those addicted to drugs, of the unemployed, the syphilitic, etc., are not only candidates for the reform school, the prison, and the asylum but help to populate the dive and brothel.

It is the custom in America to consider that every fallen woman, whether a professional prostitute or an amateur dabbler in sin, was originally the victim of some one man's lust but, as many more women are tempted or attacked than fall, it is fair to suppose that those who do succumb to man's passion have some weakness or abnormality which predisposes them to sexual indulgence. In a large proportion of cases low wages, loneliness, and all the other explanations which have been adduced are insufficient to account for lack of resistance. Recent investigations in this country and abroad show that distinct mental or physical abnormality, even if no more than "neurotic taint," is common among professional prostitutes, and it seems highly probable that while one man may be the exciting cause of wrongdoing, some man of a previous generation established the predisposing cause when he bequeathed to his offspring the heritage from a diseased body, a weakened mind, and a debased and perverted moral nature. If the prevention of venereal disease means lessening some of the factors prejudicial to physical integrity, comfort, and happiness, and if the lack of physical integrity and well-being contributes in any way to immorality, prophylaxis has a right to be carried on.

It seems unreasonable to ask that a parental government be required to replace the nursery governess, the father and mother, the school and the church in the life of the soldier and sailor and yet be refused the prerogatives of a big-hearted physician. Now, in spite of her attacks against the Government's attitude, surely the writer in Social Hygiene must know something of the vast and

comprehensive effort for good represented by the Commission on Training Camp Activities, the assistance of which commission was not forced upon the Government but cheerfully and eagerly accepted. The moment government accepts, fosters, and enlarges the services of an agent, those services may reasonably be considered part of government effort. It is only fair, therefore, to concede that the Government is exerting itself directly to promote morality in its military forces if all the influences exerted by the Commission on Training Camp Activities and other authorized workers for the Government are really on the side of morality. It is of interest to compare the attitude of the American Government with the attitudes of different Governments abroad. Some, though perhaps entertaining concern over the impairment of military efficiency due to venereal disease, are doing little or nothing, others are in great agitation but wide diversity of opinion among the people halts action. In other cases fairly successful regulation is practiced, and, if we may believe well authenticated reports, includes the establishment of carefully supervised brothels at the front. The most striking contrast is furnished by those Governments which, by means of force furnish their armies with means to gratify lust, urge one-night marriages and see virtue in "capsule impregnations."

The term "own misconduct" includes alcoholic excesses, drug addiction, etc. Just how far would Hooker's standard compel us to go if we graded the Government's liability to medical aid by the ethical aspect of the genesis of disease? Shall we decline to vaccinate a man against smallpox because he was exposed to the disease, while absent without leave, through his own misconduct? Shall we refuse to give antitetanic serum to a man who cut his foot on broken glass or rusty nail because the accident occurred as he was climbing a back-yard fence the night the police were raiding the "joint"? Is the doctor to give tonics, sedatives, soporifics, food to the drunkard verging on the horrors of delirium tremens? These are all illustrations of preventive measures against the consequences of evil practices, and since the wrath of God is directed against the sin and not against the sinner, we think that man, and even sinless woman, may incline to mercy. [EDITOR.]

Vital Statistics of the Philippines.

The following facts and figures are derived from the report of Surgeon J. D. LONG, U. S. Public Health Service, Director of Public Health, to the Secretary of Public Instruction, for the fourth quarter of 1917.

Births.—In Manila alone, 2,241, or 33.32 per thousand of inhabitants.

Marriages.—There were 543 marriages, a marriage rate of 16.15 per thousand.

Deaths.—There were 1,926 deaths in Manila, giving a rate of 28.64 per thousand inhabitants. Of these, 56 were due to typhoid fever; 125 to dysentery; 38 to tetanus; 130 to beriberi; 360 to tuberculosis. There were no deaths from cholera in the last quarter of 1917 in the city of Manila. Deaths from cholera in the Provinces were 1,805.

Bubonic plague.—There were no cases and no deaths from this disease in Manila during the last quarter of 1917. A total of 30,142 rats were caught by means of traps or poison in the city. All were negative for bubonic plague.

Segregation of lepers.—During the quarter, or rather during the month of November, a leper-collecting trip was made to various Provinces of the Archipelago, 194 lepers being gathered, 192 of whom were removed to Culion leper colony and 2 brought to San Lazaro Hospital.

Military Statistics.

[Extract from Annual Report of the Japanese Navy Department for the year 1915–16.]

Comparing the number of sick cases and the number of sick days in the Imperial Japanese Navy in 1915 with those of the preceding year, the sick rate and the rate of number invalided both increased, but the death rate decreased; and comparing with the averages of the last 18 years, the sick rate and death rate both decreased, but the rate of number invalided increased. The number of death per 1,000 of sick cases decreased, but the rate of the invalided increased.

Personnel.—The average day number of petty officers and men in 1915 is 51,439, showing an increase of 4,476 over the similar number of the preceding year, 46,963. Owing to the war, part of the reserves were called to active service, the term of those in active service was lengthened, and a larger number of volunteers and conscripts were raised; hence the increase.

Numbers in various branches are as follows:

Cadets	529
Petty officers:	
Seaman branch	5,976
Engineer branch	3,425
Other branches	1,505
Men:	
Seaman branch	22,435
Engineer branch	13,516
Other branches	3,065
Civil officials and employees	867
In prison	121
Total	51,439

	Total number.	Per 1,000 of entire force.		
		1915	1914	Averag last U years
Sick cases	40,555	788.40	755.70	78
	40,579	788.88	762.75	.....
Died	198	3.85	3.58	5.
	208	4.04	9.24	.....
Invalided from service	836	16.25	13.71	15.
	842	16.35	13.71	.....

In the above table, in columns "1914" and "1915" the low figures include the number wounded or killed in the war.

Number of cases of the principal contagious diseases and "kakke" are as follows:

Measles	
Scarlet fever	
Typhoid fever	1
Paratyphoid, type A	
Paratyphoid, type B	
Dysentery	1
Malaria	1
Meningitis cerebro-spinalis epidemicus	
Influenza	1
Kakke	1
Tuberculosis of lungs	

REPORTS.

REPORT OF 140 CASES OF PNEUMONIA, UNITED STATES NAVAL HOSPITAL, CHELSEA, MASS.

By L. W. McGuire, Lieutenant Commander, M. C., United States Navy.

Of the 140 cases of pneumonia occurring at this hospital between October and March, both inclusive, 98 were typed and 42 were not typed; 14 were type 1, 15 were type 2, 2 were type 3, 67 were type 4.

The type 4 includes the cases due to the streptococcus, which was an important factor in this series. It was not found practicable to separate the pneumococcus type 4 from the streptococcus in all cases, both being present in some, but in many the streptococcus only was found. As the streptococcus and not the pneumococcus was found in the pleural exudate which so commonly occurred, it can be safely stated that a large percentage of type 4 was a streptococcic infection. These men, when admitted, were seriously ill, very toxic, and rapidly developed serious complications, the most common being empyema, which developed in 50 per cent of this group. In other words, of 67 cases of type 4 and streptococcic pneumonia, 33 developed empyema. For a time it seemed almost the rule for the pneumonias to have fluid in the pleural cavity, necesitating aspiration, and this fluid rapidly becoming purulent. The streptococcus was the common organism present in the pleural exudate. In two cases the streptococcus hæmolyticus was present.

This outbreak of pneumonia was of an unusual form as to the etiology, its severity, and its complications. Clinically it was difficult and often impossible to differentiate between the lobar and bronchial types, as there was often present a large involvement with fluid, but many were known to be broncho-pneumonias, which would indicate a secondary infection. As there were many streptococcic sore throats being admitted and also many infections of the maxillary sinus, middle ear and mastoid, and an occasional case of streptococcic septicæmia and thrombosis of the cavernous sinus, it would seem that there was a widespread streptococcic infection present in certain localities in this district, the pneumonia being an incident in its activities.

It is interesting to note the stations in which these pneumonias developed. If we exclude the ships, 106 cases developed in this vicinity, 89 of which came from two stations, Commonwealth Pier and the Radio School. From the Commonwealth Pier came 46,

and from the Radio School 43. From the entire navy yard only four cases developed in this period; the remainder were isolated cases from different stations. Of these 89 cases from the Radio School and Commonwealth Pier, 58 were typed. Of the 58 typed, 38 were type 4, which is 65 per cent.

	Average complements.	Incidence of pneumonia per thousand.
Commonwealth Pier	3,679	12.5
Radio School	3,208	13.4
Navy yard	1,525	2.6

Measles has been mentioned in some of the Army cantonments as the probable origin of many of their streptococcic pneumonias, especially of the broncho-pneumonias. While there has been a certain amount of measles present in this district, there was no epidemic nor anything approaching one. Very few of these pneumonias followed measles (2 cases), and it does not seem to have played an important part. Many of these men gave a history of a previous infection of the upper respiratory tract before becoming ill with pneumonia. Influenza also was prevalent. Considering the places in which the great majority developed, it would seem to be a question of housing a large number of men together in close contact, as happened on Commonwealth Pier and at the radio school, resulting in the spread of acute infections of the upper respiratory tract, many of which end in pneumonia. The enlisted personnel of the navy yard, which includes many women as yeomen, lives for the most part at home and was not subjected to overcrowding or that intimate contact, which probably accounts for the small number of pneumonias in comparison with the radio school and Commonwealth Pier.

Mortality.—Of the 140 cases, 41 died, a mortality of 29.2 per cent.

Types.	Cases.	Deaths.	Per cent.	Normal mortality.
Type 1	14	1	7.2	25
Type 2	15	6	40.0	32
Type 3	2	2	.....	45
Type 4	67	22	32.8	16
Not typed	42	10	23.3	.....

As I have stated, complications were common, especially empyema. Purulent pericarditis, endocarditis, and myocarditis developed in a limited number.

Empyema was present in 49 of the 140, or 35 per cent. Of the 49 empyemas, 33 developed in the type 4 group. Of the 49 which devel-

oped empyema, 20 died, 14 of the deaths being in the type 4. It is evident that the type 4, which is ordinarily the mildest type of pneumonia, having a mortality of 17 per cent in this series, was the most virulent, due to the presence of streptococcus.

These men developed fluid early; they were commonly admitted with fluid and often with pus in the pleural cavity. This pus was usually a thin, slightly colored fluid, which, on examination, showed abundant streptococci and broken-down cells, and not the thick yellow pus commonly seen following a lobar pneumonia. It was the practice to open the pleural cavity, resect a rib and drain early in this class of cases, but many, if not most of them, died in from one to three days. It was evident that it was not the proper procedure. This was discontinued and repeated aspiration carried out with far better results. After aspiration there was usually temporary improvement. The pus would re-collect and was aspirated as often as necessary, which was sufficient to tide many of them over their pneumonia; they would apparently develop a resistance, gain strength and weight, and become good surgical risks instead of a desperate operation. None of our cases were cured of an empyema by aspiration alone. Several ran a flat temperature for from two days to a week between aspirations during their convalescence and were apparently well of their empyema, but all eventually had to have the pleural cavity drained and with most excellent results.

Serum treatment.—All of the type 1 cases received serum, although some were sensitive to horse serum, which interfered with giving large amounts. The average case received about 400 c. c., it being given intravenously in 100 c. c. doses. In several cases after administering the type 1 serum the patient had a drop of temperature, with a corresponding improvement of the other symptoms. As one patient remarked, "I came to the hospital yesterday sick with pneumonia; they gave me an injection in the arm and to-day I am well." This serum has a specific action comparable to the results obtained with diphtheria antitoxin in diphtheria. The only regret is that so few of our cases were of type 1. As our mortality in this type 1 was 7.2 per cent, the serum treatment speaks for itself. In the type 2 part of our cases received serum, some with apparent benefit, but on the whole the results were not gratifying. It is believed that better results may be obtained by using larger amounts of the serum. In types 3 and 4 serum is not used.

CONCLUSIONS.

1. There was present a severe grade of pneumonia, in large part due to the streptococcus, with a high mortality.

2. The outbreak had no connection with measles, but did follow acute infections of the upper respiratory tract.

3. The bulk of the cases occurred where large numbers of men were thrown together, often resulting in overcrowding.

4. Serum treatment is of the utmost importance in type 1, and has a promising field in type 2.

5. Wherever pneumonias are treated, laboratory facilities to determine the type should be available.

6. Repeated aspirations in empyema, especially of the streptococcic type, followed by draining the pleural cavity, offer the best chance for recovery.

REPORT OF 106 CASES OF PNEUMONIA AT THE NAVAL HOSPITAL, LEAGUE ISLAND, PA.

By F. J. Dever, Lieutenant, M. C., and R. S. Boles, Lieutenant, M. C., United States Navy.

In a comprehensive survey of the pneumonia situation in the military camps of the United States, during the past winter, several features were prominent. Probably the most significant and distinct was the large percentage of cases of empyema which developed, most of them following broncho-pneumonia secondary to measles. The infectious agent was a hemolytic streptococcus. These particular cases were most severe and occurred very early in the course of the pneumonia, and the mortality rate reported from some camps was as high as 50 per cent. The mortality rate from pneumonia itself, as reported from various camps, varied from 5 to 40 per cent, the great variation undoubtedly being due to the type of infecting organism.

The pneumonia at this hospital was of the usual clinical variety, and in no case secondary to measles. The diagnosis of pneumonia was made only in those cases presenting definite physical signs and symptoms and in which examination of sputum revealed one of the varieties of pneumococci. The total number of cases observed was 106, of which 90, or 84.9 per cent, were of the lobar variety and 16, or 15.1 per cent, of the bronchial variety. In this series deaths from all causes (as shown in Table I) totaled 27, yielding a mortality rate of 25.4 per cent. Deaths which could be actually attributed to lobar pneumonia numbered 15, giving a mortality rate of 14.1 per cent.

TABLE I.

Causes.	Deaths.	Mortality (per cent).
Empyema	5	4.71
Empyema and diphtheria	3	2.83
Pneumococcic meningitis	2	1.88
Broncho-pneumonia	2	1.88
Lobar pneumonia	15	14.15

With the cooperation of Passed Assistant Surgeon E. A. Case, United States Naval Reserve Force, an attempt was made to study the type determination in all cases, but owing to the scarcity of white mice, this was possible in but 68 cases. The result of this study is shown in Table II.

TABLE II—*Type determination in 68 cases.*

Type.	Cases.	Per cent.
Type I	11	16.1 with 2 deaths.
Type II	4	5.8 with 1 death.
Type III	9	13.2 with 3 deaths.
Type IV	39	57.3 with 10 deaths.
Streptococcus	5	7.3 with 1 death.

The sputum was collected in sterile Petri dishes and sent to the laboratory immediately. The greatest number of cases fell in the Type IV group.

We observe that the type itself is no criterion of the severity of the infection, inasmuch as many of our Type IV infections were extremely severe and rapidly fatal. It must be borne in mind that the group of organisms classified under Type IV is heterogeneous. No satisfactory distinction of the organisms of this group can be made.

TABLE III.—*Deaths due to types.*

Type.	Per cent mortality.
Type I	18.18
Type II	25
Type III	33.33
Type IV	25.64
Streptococcus	20

The study of Table III shows Type III to be the most virulent of the pneumococci. Another interesting fact revealed is the virulency of some of the organisms classified under Type IV. In prac-

tically all the statistics published prior to the use of the serum specific for Type I, a mortality rate is shown much higher than that found in Type IV group. In our present series of cases Type I presents the lowest mortality rate. This is attributed to the use of specific serum which was administered intravenously. The initial dose varied from 50 to 100 c. c., depending on the severity of the infection. We were also surprised to find that in pneumonia due to streptococci the mortality rate was less than that of Type IV.

In 80 cases the disease was initiated with a chill and in 26 cases the onset was gradual.

TABLE IV.

	Cases.	Per cent.
Onset with chill:		
Due to Type I infection	10	12.5
Due to Type II infection	4	5
Due to Type III infection	1	1.2
Due to Type IV infection	35	43.75
Due to streptococci infection	3	3.75
Onset without chill:		
Due to Type I infection	2	7.68
Due to Type III infection	3	11.11
Due to Type IV infection	4	15.38
Due to streptococci infection	2	7.68

Contrary to the usual expectation, a large percentage of Type III cases developed gradually. All Type II infections began suddenly with a chill.

TABLE V.—*Distribution of the disease.*

	Cases.	Per cent.
Left lower involved	47	52.22
Right lower involved	25	27.77
Left upper involved	4	4.44
Right upper involved	6	6.66
Right middle involved	3	3.33
Right and left lower	1	1.11
Massive (both sides)	4	4.44

The study of the distribution of the disease reveals nothing new. As shown in most tables previously reported, the lower lobe of the left lung is involved in the greatest number of cases.

It was of interest to note that the majority of men admitted with pneumonia came from the western part of the United States (30.4 per cent). The South furnished 29 per cent, the East 23.2 per cent, and the North 17.4 per cent. It was also distinctly noticeable that the men from the western and southern parts of the United States were more acutely ill and succumbed in a greater proportion than those from the northern part.

TABLE VI.—*Distribution of cases as to rating of men.*

	Cases.	Per cent.
Seaman	33	31.13
Fireman	22	20.76
Private, Marine Corps	15	14.15
Electrician	9	8.49
Machinist's mate	6	5.66
Water tender	3	2.83
Hospital apprentice	2	1.89
Coxswain	2	1.89
Oiler	3	2.83
Carpenter's mate	2	1.89
Chief boatswain's mate	2	1.89
Quartermaster	1	.94
Sergeant	1	.94
Coppersmith	1	.94
Patternmaker	1	.94
Mess attendant	1	.94
Ensign	1	.94
Pharmacist's mate	1	.94

In Table VI it is observed that the greatest number of cases occurred in the seaman branch.

In accord with the experience of the Medical Department in all other camps and hospitals we had an unusually large number of cases of empyema, all of them following lobar pneumonia. The mortality rate was low chiefly because the pneumococcus and not the streptococcus was the infecting organism in the large majority of cases. It is also likely that the mortality rate was kept down by the prompt recognition of the onset of empyema. It was our rule to make exploratory aspiration in all cases of pneumonia in which the crisis did not occur by the eleventh day of the disease. Immediately upon the discovery of turbid fluid in the pleural cavity a rib resection or thoracotomy was performed. By this method the severe toxemia, which is so common in cases where pus is retained in the pleural cavity for a considerable length of time, was avoided. We believe, contrary to the recommendation of certain authors, that thorough surgical drainage should be instituted immediately upon the discovery of turbid fluid instead of resorting to repeated aspirations until thick pus develops.

TABLE VII.—*Complications.*

	Cases.	Per cent.
Empyema; 27 cases, all following lobar pneumonia:		
Type I infection	3	11.11
Type III infection	2	7.4
Type IV infection	6	22.22
Streptococcic infection	2	7.4
Type II infection	0	0
No type determination shown	14	.....

Table VII shows the incidence of empyema in various types of pneumococcic pneumonia. The largest number occurred in Type IV infections, as was to be expected.

TABLE VIII.

	Cases.	Per cent of total number.
Serofibrinous pleurisy	4	3.76
Pneumococcic meningitis	2	1.88
Cholecystitis with jaundice	2	1.88
Ac. parenchymatous nephritis	2	1.88
Pericarditis and serofib. pleur	1	.94
Mental confusion	1	.94
Rheumatic fever	1	.94
Otitis media	2	1.88
Diphtheria	1	1.88
Pericarditis with effusion	1	.94
Enteritis	1	.94
Jaundice, otitis media and erysipelas combined	1	.94
Erysipelas and serofibrinous pleurisy combined	1	.94
Furunculosis	1	.94
Acute endocarditis, Erysipelas, Multiple neuritis, Otitis media — combined	1	.94

The complications met with were numerous and various.

Otitis media was not as common in our series as it was in the series reported from the various camps in which the streptococcic type of infection prevailed. Pneumococcus invaded the meninges in two cases, both of which died.

As a rule when jaundice occurs during the course of pneumonia, it terminates fatally. This was not true in the two cases of jaundice in our series.

In one patient, as shown in Table VIII, a series of complications occurred, all of them in themselves rather serious, namely, otitis media, multiple neuritis, erysipelas, and finally acute endocarditis. This patient recovered.

The treatment instituted was largely symptomatic. We endeavored to medicate as little as possible. Stimulation was not used unless indicated by the character of the second pulmonic sound and the quality of the muscular element of the first sound of the heart. When necessary, strychnine was used hypodermatically. Stress should be laid upon the value of open air in the treatment of lobar pneumonia. This was adhered to rigidly in all our cases with, we believe, excellent results. Our cases of broncho-pneumonia were treated *indoors*, because in our opinion these cases are harmed by open-air treatment, particularly cold air. The use of vaccines we know to be unsatisfactory, and in some instances even dangerous. We are of the opinion

that the use of vaccine in pneumonia is unscientific for the reason that its administration is supposed to produce an active immunity which means that the patient himself must manufacture the immunizing bodies. On the other hand, we are convinced that the use of a specific serum, such as the serum for Group I pneumonias, is beneficial and scientifically justified, because in this instance, a passive immunity is conferred by the introduction into the blood of immune bodies preformed in the serum of the horse.

The question of diet is important. It was our practice to be guided throughout by the appetite of the patient. Any patient who had a desire for food was given such articles of diet as soft-boiled or poached eggs, toast, rice, junket, etc., regardless of degree of fever. Those who had no inclination for food were fed on broths and milk.

SUMMARY.

1. In a series of 106 cases of pneumonia the actual death rate in the disease was 14.1 per cent, which was much lower than the average death rate in civilian hospitals.

2. The outstanding feature of the epidemic was the high percentage of empyema cases (25 per cent). Other complications were numerous and severe.

3. Vaccine treatment of pneumonia was futile, but the treatment with the specific serum in Group I cases is to be strongly advised.

EMPYEMA AS A COMPLICATION OF LOBAR PNEUMONIA.

By J. J. TOLAND, Lieutenant, M. C., United States Navy.

During the past winter at the Naval Hospital, League Island, in a series of 107 cases of lobar pneumonia, 27 cases of empyema, or 25.2 per cent, developed. The cases were of particular interest in that they were all due to the pneumococcus and none due to the streptococcus hemolyticus.

The diagnosis and treatment of the cases were of marked interest in that the percentage of empyema was very small in comparison to the statistics of hospitals in various camps and cantonments throughout the country.

The early diagnosis of empyema is indeed a most potent factor in early treatment being instituted. In our series, as soon as it was discovered that the serum was becoming cloudy upon aspiration, the cases were turned over to the surgical staff for treatment, whereupon the choice of thoracotomy or rib resection was decided upon.

Thoracotomy proved to be by no means as satisfactory as early and free rib resection. The resection of a portion of the sixth rib

in the mid-axillary line proved to be the most satisfactory due to the fact that the fluid or pus is not evacuated by gravity to any great degree, but by lung expansion. Since this is the point on the thoracic wall that the expanding lung touches last any fluid remaining is more likely to be forced out.

The anesthesia chosen depended upon the condition of the patient. Of the three anesthetics used nitrous oxide and oxygen proved to be the most satisfactory from the standpoint of the patient's best interests. This anesthesia relieved the patient of any pulmonary complication that might have arisen from ether or chloroform and so added insult to injury.

Local anesthesia was not used on account of the seriousness of the condition of each patient. They all had gone through the siege of a most severe pneumonia and by no means were able to tolerate any added physical or mental perturbation.

Operative technique.—Patients were prepared by thorough bath and purge and at the time of operation the chest wall of the affected side was painted with iodine and then cleansed with alcohol.

The anesthetic was then administered and as soon as the point of anesthesia was reached, aspiration was performed, followed by either thoracotomy or rapid partial rib resection, the latter preferred. The drainage tubes were then placed in situ and dressings applied. Patients were conscious before they were removed from the operating table.

In our early cases, the usual fetid odor that accompanies empyema prevailed throughout the wards and not only impeded recovery of patients by making them feel repugnance for food, but also caused the attendants to feel disgusted when they had to enter wards to care for these patients. After having gone along a month with the old routine post operative treatment of empyema, the modified method of using Dakin solution was instituted. The pleural cavity was thoroughly cleansed by inserting a catheter and aspirating the pus by aid of a glass syringe. This was done until the cavity was empty. The amount of fluid pus and fibrin removed was noted and then an equal amount of Dakin solution was slowly forced into the cavity and then withdrawn; this was repeated until the solution returned clear. The cavity was then filled (not to distension) with Dakin solution which was allowed to remain therein two hours. The same treatment was resumed every two hours thereafter. Daily record was made of the decrease of pus, which in every case was rapid.

During this treatment, free use of the Wolfe bottles was employed. Each morning between 8 and 8.30 a. m., a few minutes prior to treatment, the patients each blew their Wolfe bottles and expelled as much pus as possible.

Coincident with the modified method of using Dakin solution, the odor about the wards absolutely disappeared. The patients' appetites improved and each case gained rapidly in weight.

In our series of 27 cases, 6 ended fatally, two cases having died of intercurrent diphtheria, two of multilocular abscesses of the lung, one of septic endocarditis and one of hemorrhage of the lung. The multilocular abscesses were discovered post-mortem, leading us, therefore, to make a thorough and most valuable study of our cases from time to time by the use of the X-ray, the X-ray findings being the only possible method of confirming the presence of multilocular abscesses. The X-ray not only reveals the presence of the abscesses, but also is an indicator of the lung expansion, the amount of pus, and the extent of the diaphragmatic movements.

Our recoveries were such as to warrant patients returning to the duties of their ratings.

During the treatment of these cases, the interesting phenomenon, pleuritic epilepsy, occurred in four cases. In case No. 1 the phenomenon occurred upon the introduction of the catheter into the cavity; second, upon emptying the pus from the cavity. The symptoms came on as the amount ceased to flow: in our third and fourth cases, after the cavity had been filled with Dakin solution. The symptoms were as follows: First, severe pain at the angle of the scapula; second, feeling of faintness; third, loss of consciousness with profound shock; fourth, convulsions. In each case the patient recovered in about 10 minutes without any special treatment.

The dangers of this treatment are: First, pleuritic epilepsy, which may occur as above noted; second, too great pressure from the fluid; third, too rapid injection of the fluid; fourth, distention of the cavity; fifth, hemorrhage from the injudicious use of the catheter.

The complications of the empyemas were two cases of pyopneumothorax and two of atelectasis. In our two cases of pyopneumothorax, the Dakin solution, in fact any solution, was not tolerated by the patient. The cases are remaining and other treatment has been instituted. The two cases of atelectasis are improving under this treatment.

SUMMARY.

The following points are emphasized: First, all cases followed lobar pneumonia and were of pneumococcic origin. This fact probably accounts for our low mortality. Second, early diagnosis followed by prompt surgical intervention and treatment; third, the free, persistent, conscientious use of Dakin solution; fourth, free use of the X-ray from the diagnostic standpoint.

THE CYSTOSCOPE AS AN AID IN THE CARREL-DAKIN TREATMENT OF EMPYEMA.

By B. C. Willis, Lieutenant (J. G.), M. C., United States Navy.

The accurate placing of Carrel tubes, so that every portion and pocket of the wound may be reached, is only second to the thorough opening and removal of all devitalized and necrotic tissue. In the treatment of empyema we have no devitalized and necrotic tissue to deal with, so the problem is one of thoroughly dakinizing the entire cavity accurately so that fresh Dakin's Solution may come in contact with the entire infected surface. In the United States Naval Hospital, Newport, R. I., there have come to my attention 36 cases and several of them still discharged pus after most persistent efforts had been made to clear them up, the Carrel tubes having been pushed into the chest cavities with no definite idea of the extent of pockets or cavities. It was thought that if the tubes could be accurately placed by sight after careful determination of the extent of the cavity we might more reasonably expect a cure. Being familiar with the direct vision Braasch Cystoscope I could see no reason why this instrument might not be used for the purpose of thoroughly inspecting pleural cavities before placing the tubes, and further, to aid in accurately placing Carrel tubes in all pockets and over surface of large cavities. While this is by no means an ideal instrument it is a part of the armamentarium of nearly every hospital. The small speculums of one-half inch caliber, electrically lighted might be more desirable. To facilitate pleuroscopic examinations of the chest, at operations, which consist of the usual rib resection at the lowest point of the cavity, we make the incision a little longer, remove an inch and a half of rib and stitch the skin margins down to pleura of respective edge. This allows a wider angle of view in the pleural cavity, which is greatly limited if the wound edges are approximated in the usual manner. A sterile cystoscope is introduced through the opening into cavity, thorough inspection of the cavity is made, using air as a medium, and the points for the location of the tubes are selected. A new Carrel tube, stiffened with No. 23 silver wire is then passed through the cystoscope to the depth desired and the latter is removed while feeding the tube through cystoscope, so as not to pull it back out of position. The number of holes to the tube is to be judged by the depth of the cavity to be treated. We have had the apex of a pleural cavity under view repeatedly. Eight cases have been treated in this manner during the past 10 days with very satisfactory improvement in the amount and consistency of the discharge. Owing to the caliber of the cystoscope being so near that of the new Carrel tubing we are considering a new instrument with greater lumen and of a shorter curved beak. This preliminary report is made in the hope that others will try the method and report their results.

REPORT OF OPERATING UNITS AT THE FRONT.[1]

By R. G LeConte, Lieutenant Commander, M. C., United States Navy.

On June 8, six medical officers and four members of the Hospital Corps reported to me in Paris. On the following day we were assigned to duty with the American Red Cross Military Hospital No. 1 at Neuilly, where we were detailed to work in the operating rooms. The commanding officer requested that 4 nurses and an anesthetist be added to our teams from Brest, and this additional personnel reported at Neuilly at 8 a. m., June 10. Our Navy contingent then numbered 16 persons.

The German offensive started May 25 on the Chemin de Dames from Rheims to Soissons. By May 30 the Germans had taken Chateau-Thierry and were in force on the river Marne. They had come through a distance of about 40 miles on a 50-mile front. The French, assisted by American troops, stopped their further advance. The casualties were heavy. A large number of French hospital beds in the invaded district had been lost and new hospitals had to be created back of the present line. Large numbers of wounded arrived at the American hospitals in Paris from 1 to 3 days after their primary field dressing, and, in many instances, without any operative procedure except the injection of antitetanic serum. This delay of transportation caused a repetition of the surgical conditions of 1915, namely, massive infections and gas gangrene. The narrow limits of trench warfare, and, incident thereto, the prompt care of the wounded and the proximity to the battle front, had all disappeared.

Before this offensive, the hospital at Neuilly was about half full and contained 300 French wounded. Its capacity was increased quickly to over 1,000 beds, but there was no increase in the staff. The maximum of admissions to the hospital in one day was 591 patients (all Americans), the maximum of evacuations was 292, and the maximum number of patients, 1,064. More than 2,500 patients were admitted in less than a month and the mortality was about 1.3 per cent. This sudden and enormous increase in the hospital activities exhausted the medical and nursing staffs, many of whom were working for more than 20 hours a day. Our teams took charge of the operating rooms, allowing their personnel a much needed rest. During our first two days we operated on about 160 wounded, of whom more than 20 per cent had multiple wounds. We manned five operating tables simultaneously. About 70 per cent of those operated

[1] The commanding officer of the Navy Base Hospital, Brest, Medical Inspector H. C. Curl, United States Navy, in forwarding this report, says: "I was informed by the senior operating surgeon of the American ambulance at Neuilly that the work of our men was of the very *highest character;* that he had practically turned over the entire operating service to them. He asked me to express to the Bureau of Medicine and Surgery his gratitude for the help rendered."

upon were marines. The operative work then gradually decreased, and, when not occupied with it, we helped in the wards where the dressings were extremely heavy. For part of the time, owing to the exhaustion of the senior surgeon, we had charge of his wards, about 380 patients. Our stay at Neuilly was 21 days. We left Paris June 30, arriving at Brest the same evening.

The work of our nurses and hospital corpsmen was of the best and was universally appreciated by all who came in contact with them. Two incidents deserve special mention. A marine requiring a shoulder-joint amputation, and a machine gunner requiring a thigh amputation, each suffering from secondary hemorrhage and gas gangrene, required also an immediate transfusion of blood. There was no one in the hospital prepared to act as donor. All of our corpsmen volunteered, and Charles L. Steele, Pharmacist's mate, third class, United States Naval Reserve Force, and McWhite Harnsberger, Pharmacist's mate, third class, United States Navy, were chosen because their blood reaction was similar to those of the patients. This donation of blood contributed more than any other factor in the saving of these two patients' lives.

From this three weeks' duty the following conclusions may be drawn:

That the massive infections and gas gangrenes of 1915 were due primarily to delay in operations, and not to a lack of surgical knowledge. While the science of war surgery has vastly improved in three years, given the same conditions of delay as existed in 1915, the same massive infections would be encountered on the operating table to-day. Therefore, the statements made last winter by a number of accomplished military surgeons, namely, that an aseptic technique with the excision of the damaged tissue (débridement) had done away with the use of antiseptics, can apply only to cases operated upon within a few hours of the receipt of the injury. In trench warfare this condition exists, but in a war of movement it does not exist, and therefore an antiseptic which will retard or prevent massive infection should be used at the primary dressing. A study should be made to provide the best antiseptic for this purpose.

Patients that were immediately evacuated after operation, in whom the wounds were excised and then closed or partially closed and drained, did badly and required a complete reopening of the wound. By closure or partial closure the infection spread far beyond the limits of the wound. It therefore again emphasizes the fact that débridement with closure of the wound can not be done on patients that must be evacuated. Excision of the damaged structures should be done, but the wound must be left wide open, loosely packed with gauze, and some antiseptic used to retard infection.

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In severely wounded cases a long continuous ambulance journey is more harmful to the patient than one broken by rest with feeding, warmth, and comfort. The delay of six or eight hours, consumed in feeding and resting the wounded on a 40 or 50 mile ambulance trip, much more than compensates for the delay in operation, as the patient arrives at the end of his journey in a far better condition for operation.

When the bed capacity of a hospital is suddenly doubled, and its activities increased tenfold, the personnel must also be increased. It is useless to admit 400 cases requiring operation when the limit of the personnel is 200 operations a day. This discrepancy between the number of patients and the personnel at Neuilly contributed in no small degree to the lateness of the arrival of the wounded on the operating table.

PLAGUE IN CHINA AND THE FAR EAST IN 1918.[1]

By H. M. Stenhouse, Lieutenant, M. C., United States Navy.

The epidemic of pneumonic plague of 1918 in China will stand out in the annals of medical history as giving proof of the courage and unselfish devotion of doctors and missionaries who risked their all in an effort to check the ravages of this dread disease, and as a brilliant example of the complete inefficiency of Chinese in dealing with serious problems.

Inside of three months an area of 160,000 square miles was infected, whereas the spread of the disease might readily have been limited, as far as China was concerned, to the territory north of the Great Wall.

The epidemic swept rapidly along, at the rate of "300 miles in six days, in a great country where means of communication are of the most primitive nature," and later by rail in less time.

Press dispatches published early in the epidemic illustrate the attitude of the Chinese officials. For example, five days after the disease appeared inside the Great Wall—

> People are reported dying by the roadside and in the inns. Disease spreading rapidly. Deaths in one village numbered 32 in three days. Hundreds of wool carters coming from infected centers daily toward the railway and scattering infection en route. Nothing being done by local authorities to stop traffic.

Two days later the following appeared:

> Drs. Lewis, Jouvelet, Eckfelt, and Wu Lien Teh report that a mob, assisted by the police, invaded their quarters after investigating a case of plague.

[1] These notes on the plague situation in China have been made after a study of reports published during the epidemic. Our original object was to ascertain what effect it might have on the health of officers and men of the U. S. S. *Palos*. Our cruising ground is at present the Yangtze above the Gorges, where travel and communication are slow and uncertain. But we may, after the river rises, be ordered to the lower Yangtze and thus be brought into closer proximity to the danger zone. (Wanhsien, China, Apr. 13, 1918.)

The doctors were held prisoners, being refused transportation back to Peking.

Up to this time simply closing the gates of the Great Wall to all traffic would have confined the epidemic north of the wall and the control of that limited area would have been a comparatively easy task. But all warnings as to the gravity of the situation were either ignored or but half-heartedly observed. The actual conditions were masked by the "hopeful optimism" of the officials, and in the face of assumed precautions, a soldier carrying a sick child evaded the quarantine, traveled from an infected place by rail and quickly spread the disease 500 miles from his point of embarkation.

Dr. Arthur Stanley, health officer of Shanghai, observed that:

> It is the Tientsin-Pukow Railway which has subjected the lower end of the Yangzte Valley to very considerable damage. This line has for some time past been notorious as a soldier-infected road. A leakage in the northern quarantine occurred. A person from the infected area in northernmost Shansi incubating pneumonic plague passed through Fenchen and through Kaifeng on a certificate of medical inspection only, without the absolutely essential detention under observation during a quarantine period of five days at the shortest. * * *
>
> This infected person is reported as having taken the train at Peking when already in the initial stage of the actual disease. She started coughing on the train, became worse, and died soon after reaching her home at Fengyang, Anhui, which is about 100 miles north of Pukow (Nanking). This case infected persons among her immediate family and neighbors, who all died of pneumonic plague between February 6 and 9.

There is probably no place in the world where silver and gold fail to affect the lives and habits of the people. But China is literally living from hand to mouth that money is the ever-present aspiration of everyone. And money will purchase anything. Now it is a question of having to stop trains or to decimate the population the latter is doomed to die unless more money is to be made by stopping the railways. The governor of Suiyuan "refused to believe that plague even existed." Evidently the governor's reason for disbelief was the revenue derived from the wool carters, which amounts to $500 daily, passing through his hands. It was not until the "group banks" came through with a loan of $240,000 and a promise of $1,200,000 that action was really taken toward protecting the lines of communication. And as shown, the practical effectiveness of this protection was nullified by fear of a "truculent" soldier.

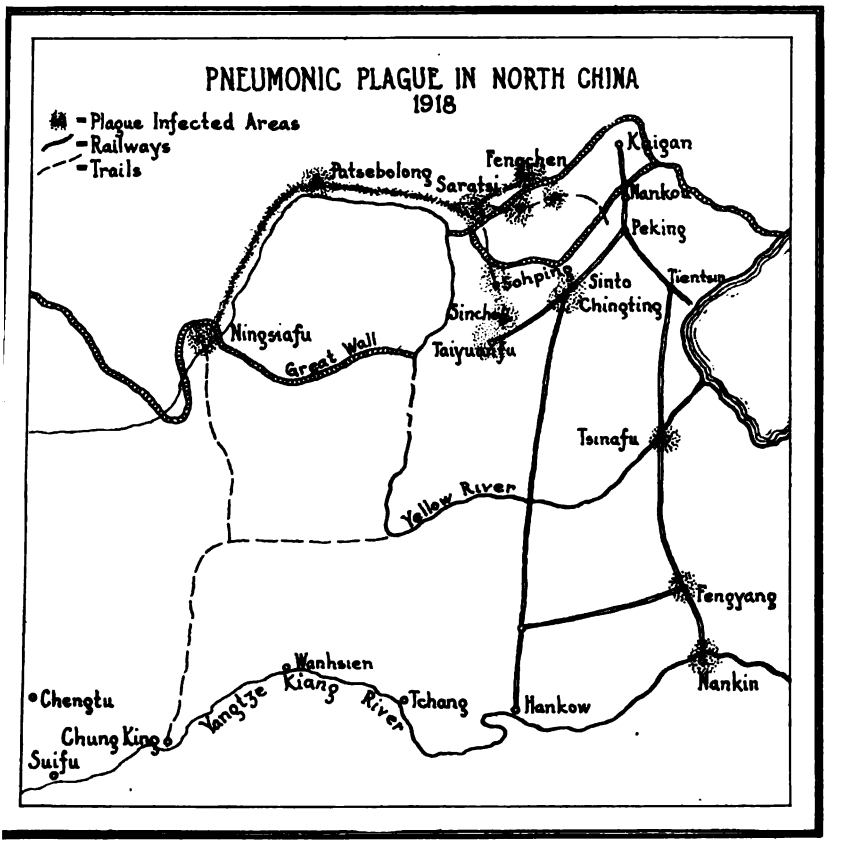
PROGRESS OF THE EPIDEMIC.

The following is a brief chronicle of the epidemic:

November 15, 1917: Origin at Patsobolong, Mongolia.

January 5, 1918: Cases appear outside and to north of Great Wall.

January 17, 1918: Three cases south of Yenmen Pass (Great



Epidemic started at Patsebolong Nov. 15, 1917 It spread along Mongolian Trade Route. Jan 5, 1918 at Sopingfu 6 cases occurred. From there it spread rapidly reaching Fengyang Feb. 28, 1918. The area north and south of the Great Wall was heavily infected largely because prevention was antagonized by officials. March 1, 1918 four deaths were reported from Ningsiafu (Kansu). Within three and one half months infection spread over 1500 miles, largely in regions without rapid transit.

Wall). Two deaths at Sinchow. Reported present at Taichow. All other passes closed.

January 18, 1918: Deaths reported along road south of Taichow. (four days north Taiyuanfu by cart). Prevention stations established at Kalgan and Kangchuan. Peking still untouched. All railways running as usual except Peking–Kalgan road.

January 20, 1918: Increasing at Saratsi.

January 21, 1918: Peking officials begin to realize seriousness of situation. Begin to train plague prevention police. At Fengchen 11 deaths to date. Situation serious at Paotowchen. Traffic to be intercepted eastward. All travelers to be placed in quarantine six days. Suiyuan governor decides to allow preventive measures. Tohsien, spreading rapidly. Saratsi, 1,000 deaths in five days.

January 22, 1918: Two soldiers die of plague at Fengchen. Total deaths there to date 27. Kweihachen, 100 deaths. Hsinchow. 13 deaths between 16th and 22nd of January.

January 23, 1918: Tatungfu without plague. Four cases develop eight *li* distant. Saratsi, conditions bad. Traffic down Yellow River not stopped. Fear spread south through Shansi.

January 24, 1918: Tatungfu; city divided into four sectors each under a physician (Drs. Smyly, Chen, Jouvelet, and Kosuge). Domiliciary inspections instituted. Two deaths, one proven bacteriologically. Gates closed at Paotowchen. Peking announces receipt of advance of $240,000 by group banks to combat plague. Total of $1,200,000 to be loaned for that purpose. Government consents to establish properly equipped quarantine station at Nankou. Sun Ts'ung; 17 deaths to date. Taichow; 35 deaths; disease spreading rapidly. North of the Great Wall 1,000 deaths in 5 days. Saratsi, deaths increasing. Gates closed. Dr. Young working at Taiyuanfu.

January 27, 1918: At Fengchen, 4 deaths among soldiers. Total of 34 deaths to date. Taiyuanfu; 233 deaths to date. Saratsi, nearly all villages infected. All infected die. Kansu reports plague spreading westward. Has reached Santaoho, north of Ningsiafu. Belgian priest dies; 3 others infected.

February 1, 1918: Peking hopeful of keeping plague from coming south. Ministry of Interior divides infected area into four districts.

MINISTRY DIVIDES INFECTED AREA INTO FOUR DISTRICTS.

First. Suiyuan area under Dr. Chuan Shao-tsing "with full power." (Area of 10,000 square miles.) Most heavily infected territory.

Second. Charhar under Dr. Ho Show Yin.

Third. From Tatung north to Provincial Boundary and south to Yenmen Pass. Under Tuchun of Shansi with Dr. S. P. Chen as

medical director of quarantine stations at Kalgan and Nankou t keep Kingsui Railway open. (Area of 35,000 square miles.)

Fourth. From Yenmen Pass southward along the Great Wa under Tuchun of Shansi. Boundaries of Chihli, Charhar, a Shansi to be strictly watched by troops under Tuchun of Chih Gen. Chiang is responsible for preventive and suppressive measu generally. (Area of 75,000 square miles.)

February 3, 1918: Sinlo reported infected. Shansi south of Wa 35 deaths in two days. Fengchen; total deaths, 70.

February 5, 1918: Inside Wall near Yellow River is a newly- fected area. It is announced that the road on both sides of the Y low River should be watched as well as the river itself when op to boats. Translations being made of plague literature. No n cases for a week in Taichow district.

Feburary 15, 1918: Tingchow; no further cases. Chentinfu; s isfactory. Huts to the number of 200 shipped to Fengchen for vance quarantine station. Pekin announces: "Spread of plague i under control."

February 18, 1918: Suiyuan district, 1,500 dead; more in outly regions. Shansi; 116 dead in past two days.

February 23, 1918: Four suspicious deaths in Pekin. Averag 60 deaths a day in Shansi admitted officially.

February 28, 1918: Fengyang, Anhui; 8 deaths from bub plague; Pengpu; 1 death.

March 1, 1918: Tsinanfu, 4 cases.

March 15, 1918: Nanking, 25 cases.

Table of reported cases.

Place.	Cases.	Date repo
Fengyang	8	Feb. 28
Fengchen	76	Feb. 2
Hsinchow	13	Jan. 18 1918
Kwei Wha Chen	100	Jan. 22
Tsinfau	4	Mar. 1
Pengpu	1	Feb. 23
Santaoho	4	Jan. 23
Saratsi	1,000	Jan. 16 1918
Shansi	157	Feb. 3
Sinchow	2	Jan. 17
Suiyuan	1,500	Feb. 18
Sun Ts'ung	17	Jan. 24
Taichow	38	None Feb. 1
Taiyuan Fu	233	Jan. 27
Tatun Fu	6	Jan. 24
Taihsien	17	Jan. 24

Coolie carrying rice, Wanh Sien, Yangtze Valley.

Junk on upper Yangtze.

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The figures above are not to be regarded as statistics. There is no such thing as a registration area in China outside the larger treaty ports. The only information to be had from the infected territory is that from volunteer workers. The situation is far worse than one would at first imagine from a cursory glance at the figures alone. They should only be considered in tracing the progress of the epidemic. Only 2,952 deaths are there represented. As a matter of fact 1,000 deaths were occurring in a few days in some neighborhoods.

The alteration in the type of the disease from pneumonic to bubonic at Fengyang, Anhui, is noteworthy. This may have been transmitted by human fleas or it may have resulted after development of the disease in a rat.

Tingsiang in Shansi seems to have fared better at the hands of officials than most of the plague regions. Here it was no doubt largely through early devastation that the people so readily fell in with the advice of physicians. The plan worked out in this district reflects credit on all concerned. The following plan of organization is of interest:

> In combating the pneumonic plague in Shansi it has not been possible to follow very closely the methods employed in Manchuria seven years ago. In the first place there is no hospital in all the north of Shansi above Taiyuanfu. In the second place there are no railways between Tatung on the north and Taiyuan on the south. Finally the territory affected has been predominantly rural rather than urban. In Manchuria seven years ago it was possible to work in hospitals, with the railways as bases, and practically all the work was done in large cities. In view of these different conditions a new type of public health service has been developed in the present campaign, and the writer believes that giving wide publicity to the methods employed, especially in villages, will be of great service to the Chinese people and to all who may be called upon to combat this or similar epidemics in the future.
>
> Tingsiang is a small district, having a total of but 96 villages. The district city is practically the geographic center of the district. At the beginning of the campaign an attempt was made to hold all travelers returning from infected area in detention stations at the passes, or in the detention station at the district city. Within a day or two, however, these detention stations were filled. To correct this "travelers were permitted to return to their native villages, but were promptly interned either in their own courts or in public buildings such as temples."
>
> When plague appeared in a village that village was promptly isolated. * * * Within the village itself there was, of course, the isolation of the plague patients and contacts.
>
> Following this "more drastic measures were adopted. The city gates were closed to all persons except those holding special permits from the antiplague office. All the villages in the district were isolated, intercourse from village to village being strictly forbidden."

Looking toward the future we must consider another source of danger to China, especially to the Upper Yangtze, from the bubonic

plague in India, Siam, and French Indo-China. This region is in fact nearer than the Mongolian epidemic was. And there is rail communication within 100 miles of Szechuan which comes through Tonkin, one of the infected areas of Indo-China. Furthermore, the main road southward out of Chungking passes through Yunnanfu (the French railway terminus), directly to the borders of Burma thence to the British railway terminus, which runs from Mandalay almost to the border of Yunnan. Almost all of India is infected with bubonic epidemics, the Madras Presidency being probably the most heavily infected part.

Stitt in 1914 said:

> The plague epidemic with which all parts of the world are now so concerned is supposed to have originated in China, in the Province of Yunnan.

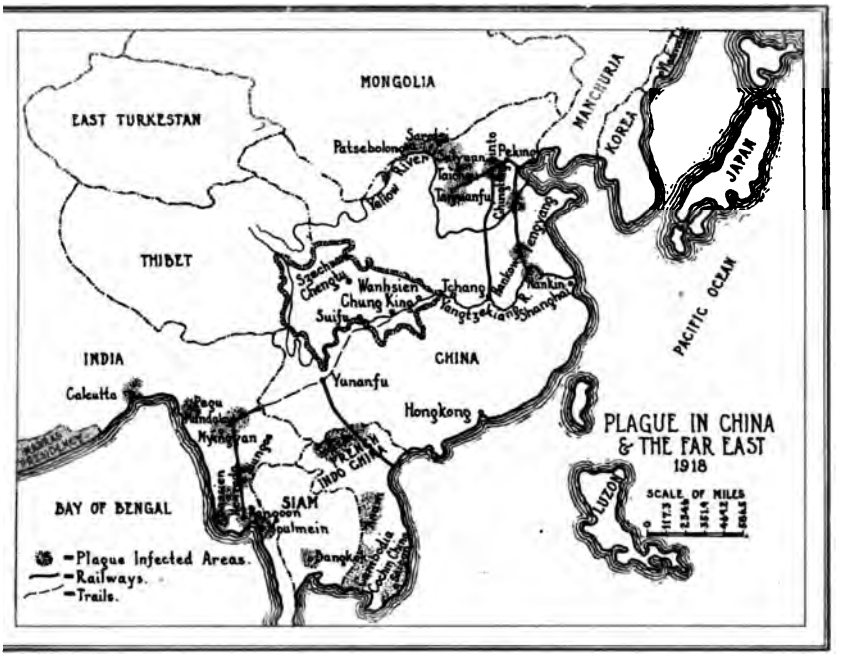
The proximity of Yunnan to India is significant, and the nearness of Yunnan to Szechuan is equally important. It suggests the possibility of this interior China being a huge reservoir of infection.

During the past year it is estimated that 100,000 Yunnan and Kweichow soldiers have entered Szechuan. They have taken over the entire Province and have carried on military operations requiring the transportation of supplies and munitions from the southern country to the area of conquest. All of this has been done by coolies. It will be seen that the actual number of men coming from questionable districts is probably at least twice 100,000, probably 400,000 or 500,000. This military migration continues and is utterly void of any sanitary or hygienic organization or arrangement.

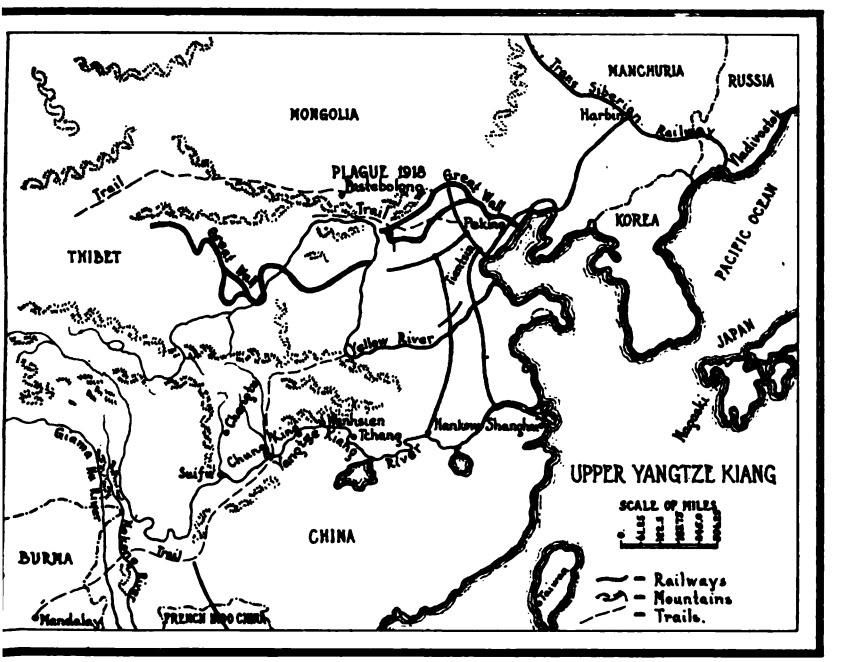
Reference to the following tables and to the map will show more clearly the danger from this direction. When we realize that 15,000 junks ply between Ichang and Chungking the year round, and that steamers run between these two cities in the summer and below Ichang to Hankow the entire year, we can appreciate what is in store for China if plague begins to take root in Szechuan.

To account for the absence of cases here we can not plead too strongly for the theory of isolation, although the map shows certain natural barriers. Rivers are more or less an obstruction to rodents. But rivers which are crossed by boats reduce the obstruction, and human cases naturally could be carried across rivers during the incubation period. Mountains are natural barriers to rodents if they are high enough and afford scant vegetation or other food. High altitudes operate against invalid migration. Distance increases the protection.

It seems unlikely that these natural barriers are wholly responsible for Szechuan's freedom from infection. There must be other



Bubonic Type is prevalent south of China and at Fengyang. The Pneumonic Epidemic is in Mongolia and North China. In India there were 17,000 cases in 14 days 100,000 soldiers have come to Szechuan from Yunanfu and Kweichow in the past year



City wall, Quay Fu, Yangtze Valley.
Junk on upper Yangtze.

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factors operative, such as sectional immunity or periodic immunity, or existence of the disease in mild endemic form.

Sectional immunity may be due to two causes in addition to natural barriers: (1) To active immunization after the ravages of a previous epidemic; (2) climatic conditions.

Periodical immunity is something about which we have still much to learn, though it probably depends to some extent on the immunization from previous epidemics. It was suggested by Dr. Clements of the Philippine health service during an epidemic of cholera in the Philippines in 1916. He believed that cholera returned in wavelike intervals of a certain number of years, and he was working on that idea with Dr. Long of the United States Public Health Service, then director of the Philippine health service. No doubt their findings have been published, though we do not have access to them.

It may be that plague exhibits this tendency to recur after an interval of years, perhaps depending upon the persistence of active immunity developed in a previous outbreak and transmitted weakly to succeeding generations.

"Dr. Kitasato, in a lecture, traced the plague as far back as 200 A. D., when it found its way to Egypt and Europe. The visitations were reported until between the end of the thirteenth century and the beginning of the fourteenth. Europe, as medical science advanced, was able to drive out the pest except for an inconsequential outbreak some 11 years ago."

At any rate, there is nothing to prevent plague spreading in Szechuan if introduced unless it can be explained as above. It would mean periodical rat immunity as well as human immunity, for rats are accepted on equal social terms with the average resident of this region. Rat fleas are not conspicuous by their absence if the few which we have examined are to be taken as examples.

Statistical table.

INDIA.

Date.	Cases.	Deaths.
Apr. 15–June 30, 1917	43,992	30,197
July 1–Oct. 20, 1917	45,657	34,074
Oct. 21–Oct. 27, 1917	13,571	9,390

Statistical table.—Continued.

DISTRIBUTION.

Place.	Date.	Cases.	Last report.	Cases
Bassein	Apr. 1–June 30	54	July 1–Oct. 13, 1917.	
Bombay	Apr. 22–June 30	397	July 1–Oct. 20, 1917.	
Calcutta	Apr. 29–June 2	38	July 1–July 21, 1917.	
Henzada	Apr. 1–June 30	35	Aug. 12–Sept. 15, 1917.	
Karachi	Apr. 22–June 30	468	July 1–Oct. 20, 1917.	
Madras Presidency	Apr. 22–June 30	250	July 1–Oct. 20, 1917.	
Mandalay	Apr. 8–May 12	9	July 29–Oct. 10, 1917	
Moulmein	Apr. 1–June 30	74	July 1–Oct. 10, 1917.	
Myingyan	Apr. 1–Apr. 7	1	None	
Pegu	May 27–June 2	2	July 29–Sept. 22, 1917.	
Rangoon	Apr. 15–June 30	183	July 1–Oct. 20, 1917.	
Toungoo	Apr. 8–Apr. 14	2	July 29–Sept. 1, 1917	

INDO-CHINA.

Date.	Cases.	Deaths
Feb. 1–June 30, 1917	730	
July 1–Aug. 31, 1917	119	

DISTRIBUTION.

Place.	Date.	Cases.	Last report.
Anam	Feb. 1–June 30	232	Aug. 1–31
Cambodia	Feb. 1–June 30	132	Aug. 1–31
Cochin China	Feb. 1–June 30	219	Aug. 1–31
Kwang Chow Wan	May 1–June 30	34	
Tonkin	Feb. 1–June 30	113	Aug. 1–31

SIAM.

Place.	Date.	Cases.	Deaths
Bangkok	Apr. 22–June 30	13	
	July 3–Oct. 27	31	

RELIEF WORK AT GUATEMALA CITY.

After the earthquakes of December, 1917, and January, 1918.

By S. M. Taylor, Lieutenant, M. C., United States Navy.

Having received orders from the Navy Department to visit city of Guatemala and report on conditions and render what aid

Views of the hospital of the French Catholic Mission, Chieng-Kin.

could, Capt. Brumby and two other officers, two pharmacist's mates, one hospital apprentice, second class, and myself, left San Jose in the morning by special train, and arrived at Guatemala City at 4 o'clock in the afternoon. Before arriving at the city we saw a number of buildings along the railroad that had been destroyed by the earthquake. Dr. A. M. Struse, of the Rockefeller Institute, met us at the train, and he and I and the pharmacist's mates with equipment, went to the first-aid station established by him. Here I found no equipment, and patients were waiting by the score to have their wounds dressed. We worked till nightfall, when I went to the American Legation to report the conditions to Capt. Brumby.

Capt. Brumby, Ensign Purdy, the staff of the legation, a number of refugees, and myself spent the night in the court square of the American Legation, sleeping on mattresses—the other officer and the hospital corpsmen sleeping in a stable near by. We were sitting on the veranda when the most terrible earthquake came; this was at 10.30 p. m. We all immediately rushed out in the court square, and it was with difficulty that we could keep our feet. The earth seemed to be rolling in waves, not a to-and-fro motion, but an up and down one. The disturbance seemed to be directly under us. The shock lasted 10 seconds, and from then on till daybreak there was a continuation of earthquakes. Ensign Purdy and I counted 240 quakes during the night. The next morning, as soon as we could get out of the legation without some of the walls falling in on us, I went immediately to the first-aid station. On the way down I noticed that a great many more buildings had been destroyed during the night. People were waiting by the hundreds to have their wounds dressed, and the hospital corpsmen and Dr. Struse were already busy dressing the wounded. We worked till 12 o'clock and had dressed all of the injured that had applied for assistance.

The following is a list of the hospitals in the city and their several capacities before the earthquake on December 25:

	Beds.
Hospital General	800
Hospital Militar	300
Hospital De Venereas	100
Hospital Americano	25
Hospital De Epidemias	100
Hospital De Leprosos	100
Asilo de Dementes	300
Asilo de Maternidad	200
Asilo de Convalecientes	200
Asilo de Mendiyos	100
Hospital de Los Caraely	200
Hospital antirabico	100
Hospital de vacuna	25

All the patients of the above hospitals were removed to the open after the quake on December 25, as every one of the hospitals was

practically destroyed. Many of the instruments and practically all of the medicines and dressings were lost, owing to the fact that the heavy walls buried them. Fortunately not many of the patients were killed, but no one could give a correct idea as to how many had been killed. After the quake on January 3, 1918, every hospital and such parts of them as were left standing were totally destroyed, and any patients that were not removed far enough away in the open were killed. The American legation was the only building left standing in the city after the shock on January 3, 1918, and it was considered very unsafe, as the walls had large cracks in them. The sewage disposal was only fair before the earthquake, the discharge emptying into a creek below the city. After the quake all or pracitically all, of the pipes burst, and their contents were emptied into the streets. Before the quake there were two water supplies, one coming from a large spring, and the other from a river. The one coming from the river was considered bad. This condition had been reported to the Government, but no effort was made to remedy it. After the quake there was no water to be had in the city, and it was a common occurrence to see the people drinking the water from the sewers.

There were 70 native doctors in the city before the quake, but I am sorry to say that 40 of them left imediately after the first quake. There were 50 drug stores that were completely destroyed and practically nothing could be saved. Great credit must be given those native doctors who did stay and gave all their efforts to help relieve the dreadful situation.

BULLETIN NO. 1 OF THE BOARD OF HEALTH OF THE ROCKEFELLER FOUNDATION.

With the idea of preventing typhoid fever, dysentery, and other intestinal infections the following measures should be taken:

1. Each family will endeavor to build provisional toilets. In order that these should fulfill their full object, they should be a yard in depth.

2. The water for drinking should be used boiled, filtered, or mixed with another chemical substance, among the most practical are the hypochlorite of lime and the tincture of iodine. In order to use the hypochlorite of lime, take one gram of it and mix with one liter of water, shake it and use it 15 minutes after. The tincture of iodine should be used in the following manner—to a liter of water add two drops, shake and wait 15 minutes before using.

3. In order to prevent smallpox it is necessary that one be vaccinated. This office has requested of the home office in New York a sufficient quantity of the vaccine to vaccinate against smallpox, typhoid fever, etc. As soon as it arrives it will be distributed gratuitously.

This board established an emergency hospital on the second avenue south, opposite the Escuela Practica Senoritas.

GUATEMALA, *December 31, 1917.*

Among the most prevalent diseases were typhoid; typhus (in outskirts of the city); malaria; smallpox; tuberculosis common, especi-

ally grandular; goiter common, especially among men; dysentery amebic and bacillary (high infant mortality); venereal diseases, very prevalent; hook-worm, 22 to 25 per cent; and epidemic cerebro-spinal meningitis, mostly among the native soldiers. To make matters still worse the officials try to conceal the contagious diseases.

The medical authorities were practically powerless to do anything. They would recommend sanitary measures only to have them ignored. They could not get the people to carry the wounded to the first-aid station, and when told to work they refused. It is true that the native soldiers shot a great many people for looting, but it seemed that they would not help to guard the hospitals and the first-aid stations properly.

Among the most severe injuries were the following: Contusions of all kinds; fractures, simple and compound; peritonitis; and severe lacerations of all kinds. A great many of the people seemed to have nothing physically wrong with them, but seemed to be suffering from shock, which was characterized by extreme nervousness and vomiting.

During the month of December there had been a great many earthquakes, but the people did not pay much attention to them. The first powerful earthquake occurred at 10.30 on Christmas evening, the second at 10.45, and the third about 11 p. m. These three shocks practically destroyed the city. Smaller shocks occurred during the night. On Saturday, at 2 o'clock in the afternoon, occurred the next large shock. This shock killed Dr. Volla, a prominent native physician. The next large shock came at 12 o'clock New Year's night. The last and most terrible of all the shocks came at 10.30 on the evening of January 3 while we were there in the American Legation. This shock was considered by all the most severe. This last shock completely destroyed the city with the exception as stated before of the American Legation.

Fortunately the food conditions were good, and the Government had established stations where food was given out. As to medical supplies, the conditions were very bad, as there was practically nothing left. It is estimated that about 350 persons were killed and 800 wounded.

In the cemetery at least 10,000 bodies were thrown out of the graves by the force of the shocks. These bodies were immediately burned in oil.

Great credit is due Chief Pharmacist's Mate William Schofield, Pharmacist's Mate (Third Class) C. A. Ray, and Hospital Apprentice (Second Class) W. W. Methven, United States Navy, who repeatedly exposed themselves to danger in falling buildings in order to bring out the injured.

REPORT OF AN EPIDEMIC OF 3-DAY FEVER AT THE UNITED STATES NAVAL AIR STATION, ——— FRANCE.

By D. FERGUSON, Lieutenant, M. C., United States Navy.

An epidemic resembling influenza, which has been sweeping through Europe, reached the United States Naval Air Station at ———, France, on June 24, 1918. The French authorities reported an epidemic in Algiers, in the eastern Mediterranean States, and the eastern Adriatic littoral during the spring and summer of 1917, and according to information received by medical officers of the United States Army considered these epidemics as dengue and pappataci fever. It is now thought that these epidemics were the beginning of the one now prevailing.

Etiology.—Up to May 27, 1918, the exciting organism was not definitely identified. Since then, in eight cultures made on cases in the ——— Regiment, United States Army, American Expeditionary Force, at Base Laboratory, Base Section No. 1, five cultures were positive for an influenza-like organism, described as a small gram negative bacillus in symbiosis with the pneumonias. It grows only on blood medium and presents the characteristic dew-drop colonies. It is very difficult to grow alone and to transplant. Morphologically it is indistinguishable from Pfeiffer's organism, but, due to the difficulties attending research, it has been impossible as yet to determine accurately its biological characteristics. Cultures are *non*-toxic for rabbits.

In a series of 20 blood cultures all were negative, though everything pointed to a general infection.

A series of 20 pharyngeal cultures were made at Base Hospital No. 8, American Expeditionary Force, and the results will be available for our study on the return of the bacteriologist from detached duty at the front. The final opinions of the laboratory men of the American Expeditionary Force as to the identity of the organism will be forwarded as soon as they become available. No immunizing work has been attempted as yet. White and colored races are equally susceptible.

Symptoms.—Sudden onset of fever, varying from 90° to 105°, more commonly 102°, with intense headache, backache, and general pains throughout the body. The degree of prostration varies greatly in different cases. Pain in the chest, made worse by deep inspiration, and some cough without corresponding physical signs were characteristic of the majority of cases.

Physical signs.—The majority of cases were negative on physical examination except for infection of the pharynx and infection of the conjunctiva, the latter giving the appearance of " pink eye."

Clinical course.—The fever attains the highest point within 36 hours, falls rapidly, and is generally normal at the end of 48 or 72 hours. Appetite returns with the fall of the fever and the patient usually goes to duty after 3 days in the sick bay.

Complications.—In the 163 cases treated here there was no mortality, and the only serious complications were a case of otitis media and a case of frontal sinusitis.

Treatment is purely symptomatic.

Prevention.—The surgeon of Base Section No. 1, American Expeditionary Force, is of the opinion that, in view of the benign character of the disease and its rapid spread, the isolation of affected units and organizations would not be justified. The daily airing of bedding and quarters and the discouragement of promiscuous spitting are preventive measures recommended. It has been noted that there was a relatively higher proportion of cases among the men quartered in barracks than among the officers quartered in billets.

Epidemiology.—The statistics of the American Expeditionary Force show that from 12 to 80 per cent of the men in different units were affected. An epidemic lasts from 10 to 20 days. The epidemic was usually at its highest within a week after the first case was reported.

The incubation period appears to be from 2 to 3 days, and the disease is important from a military standpoint solely on account of the sudden noneffectiveness of nearly half the personnel exposed.

REPORT OF A DEATH FROM ANTHRAX.

By H. B. LEHMBERG, Lieutenant, M. C., United States Navy.

The patient, a fireman, second class, age 27 years and 7 months, a native of California, 5 feet 8 inches high, weighing 151 pounds, was admitted to the United States Naval Hospital, Honolulu, Hawaii, on January 27, 1918. The patient had been in good health until the night of January 24, when he scratched with his finger nails a small macule on the right cheek, which he ascribed to the bite of a mosquito. The scratching was soon followed by inflammation of the area and pronounced swelling of the cheek. Constitutional symptoms made their appearance promptly and the patient developed a temperature of 103°, with a pulse of 118 and a respiratory rate of 22 to the minute. The swelling was incised and Wright's dressing applied. When first seen by the medical officer in the hospital the patient had a temperature of 103.6°; pulse rate, 124; respiratory rate, 22. The right cheek showed a small pustule about 1.5 centimeters in diameter, with a center slightly depressed and brownish in color. Owing to the incision that had been made the pustule was not typical in ap-

pearance, but anthrax was suspected and smears were made. These smears were negative for anthrax bacilli but positive for streptococci. Dakin's solution was used for a local treatment, while tincture of chlorid of iron and ipecac were administered internally. On January 28 smears were again negative for anthrax bacilli and so was the blood. Cultures were made. There was no improvement in the patient's condition. On January 30 the cultures made on January 28 showed the presence of a few anthrax bacilli, but the infection had become so generalized that the excision of the pustule was thought not advisable. On January 31 the temperature dropped to 101°, the pulse to 72 per minute. The patient became delirious, vomited, and developed other symptoms of cerebral irritation. A spinal puncture was made and an examination of the fluid showed it to be loaded with anthrax bacilli. The patient died at 6.45 p. m., January 31, 1918.

PRESENCE OF BALANTIDIUM COLI IN THE VIRGIN ISLANDS OF THE UNITED STATES.

By H. RYDEEN, Pharmacist (T.), United States Navy.

The patient, a girl 11 years of age, who has never been away from St. Thomas, complained of getting "dizzy" and of frequent loose bowel movements.

On examination of feces ova of Ascaris lumbricoides, Trichiuris trichiura, Necator americanus, and motile Balantidium coli were found.

Examination of feces following medication with santonin and betanaphthol showed only encysted forms of Balantidium coli. Subsequent examinations five and seven days later showed them as they were first seen. This is believed to be the first case of Balantidium coli reported from these islands.

It has been noticed that it is rather difficult to distinguish this organism in solid or even semisolid feces, but this can be overcome by emulsifying a small quantity of feces in water at a temperature of 37° to 38 C. Encysted forms can best be seen by using the method recommended by Rear Admiral E. R. Stitt, M. C., United States Navy, of mixing feces with iodine solution (Lugol's).

REPORT ON TETANUS INFECTION.

By JUDSON DALAND, Lieutenant Commander, M. C., United States Navy.

Some time ago I met an American physician whom I have known for some years and who has spent about 10 years in Germany, where he remained until March, 1917. He served in a hospital in Berlin

and told me that soldiers who had received wounds at the front, when operated upon subsequently for any reason whatsoever, as an appendectomy, for example, frequently developed tetanus and died. It appears that tetanus bacilli were introduced into the patients at the time of the original wounds and remained latent or local until they became active in consequence of a lowered resistance due to the second operation. It is now the rule in the hospitals in Germany that all such patients, before a second operation, receive an immunizing dose of the antitetanus serum which absolutely prevents the occurrence of tetanus.

I believe that this information is of great practical value and should be transmitted to the medical officers of the Army and Navy.

UNITED STATES NAVAL MEDICAL SCHOOL LABORATORIES.

Additions to the pathological collection, United States Naval Medical School, January-June, 1918.

Accession No.	Tissue.	Diagnosis.	Collected by or received from—
1398	Blood smears	Benign tertian malaria	Commander C. St. J. Butler, M. C.
1399	.....do	B. lepræ	Do.
1400	Feces	Various ova parasites	Do.
1401	Blood smears	Quartan malaria; estivo-autumnal malaria.	Lieutenant Comdr. F. X. Koltes, M. C.
1402	.....do		Lieutenant T. T. Gately, M. C.
1403	.....do	Benign tertian malaria	Lieutenant E. Dockry, M. C.

BOOK NOTICES.

PRACTICAL BACTERIOLOGY, BLOOD WORK, AND ANIMAL PARASITOLOGY, by *E. R. Stitt, A. B., Ph. G., M. D.* Fifth Edition. P. Blakiston's Son & Co., Philadelphia, Pa., 1918.

All the good features of other editions of this book have been retained, and the new volume, without noticeably exceeding the bulk of its predecessors, contains much new material. This was made possible by the use of interpolations in smaller but perfectly legible print. Rear Admiral Stitt has recently been promoted to the rank of rear admiral as an official recognition of his services to the Medical Department of the Navy and to the scientific world during the course of the last 29 years.

Rear Admiral Stitt's many years' experience as a teacher in the laboratory of the Naval Medical School, Washington, D. C., and his association with students at the Jefferson Medical College, Georgetown University, and George Washington University have made him peculiarly well qualified to impart instruction in a simple and lucid style.

A MANUAL OF CLINICAL DIAGNOSIS, BY MEANS OF LABORATORY METHODS, FOR STUDENTS, HOSPITAL PHYSICIANS, AND PRACTITIONERS, by *Charles E. Simon, B. A., M. D.* Ninth Edition. Lea & Febiger, Philadelphia and New York, 1918.

In general this book attains a high standard of usefulness, and the fact that a ninth edition has been called for is no small tribute to

the value of the book. It would be ungenerous to allude to minor defects but for the fact that by mentioning oversights or inaccuracies these may be corrected in a possible tenth edition. Four types of pneumococci are mentioned, but the methods of determining and differentiating them are not given. No mention is made of the different types of meningococci nor of the Dryer technique for determining typhoid and paratyphoid infections. In discussing the Wassermann test on cerebro-spinal fluid the author does not state whether he inactivates the fluid or not. In the description of the preparation of amboceptor the injection of animals is described, but it is not stated whether the injection is given intravenously, intraperitoneally, or subcutaneously. The term typhoid serum is used when presumably antityphoid serum is meant. The author has not always followed the usually accepted authorities in the matter of nomenclature; thus he speaks of Plasmodium immaculatum instead of Plasmodium falciparum, and of Uncinaria americana instead of Necator americanus. In the study of gastric contents no mention is made of the "fractional method." The duodenal contents are not considered.

THE TREATMENT OF WAR WOUNDS. By *W. W. Keen, M. D., LL.D.* Second edition. W. B. Saunders Co., Philadelphia, Pa., 1918.

The book has been considerably enlarged and improved since the appearance of the first edition last year. It now forms a compact, practical handbook reviewing the principal features of modern war surgery.

THE SERIOUSNESS OF VENEREAL DISEASE. By *Sprague Charleton, M. D., F. A. C. S.* Paul B. Hoeber, New York, 1918.

This small but beautifully prepared volume is a reprint of a limited edition arranged by the author as a gift for Base Hospital No. 48. It contains 26 pictures of syphilitic manifestations, each accompained by a few words of text. At the end are instructions to men having gonorrhea and syphilis. As a sample of the bookmaker's art this little volume is admirable. Considered, however, as a contribution to the campaign against venereal disease, its value is questionable. The object of all instruction and education should be toward the cultivation of purity, continence, and self-control. Without these restraints, fear of the consequences acts only during the absence of serious temptation or leads to irregular methods of sexual gratification in which risk to health is supposed to be less. On the other hand, the wisdom of giving this book to a patient having a venereal disease may be questioned because so many of them have an exaggerated horror of their predicament.

THE MEDICAL REPORT OF THE RICE EXPEDITION TO BRAZIL. By *W. T. Councilman, M. D.*, and *R. A. Lambert, M. D.* From the School of Tropical Medicine, Harvard University. Cambridge. Harvard University Press, 1918.

An interesting account of an expedition primarily undertaken for a study of physical geography, especially that of the region between the Rio Negro and the Orinoco River. Owing to the extremely low water in the Rio Negro the original intention could not be fully carried out. The report contains a chapter on the Amazon Valley. Speaking of the Indians of the Rio Negro, the report says:

> Certain of the customs are also to the advantage of the male, as when a woman gives birth to a child the father goes through a period of rest in his hammock and receives delicacies and congratulations.

> The valley of the Amazon is the most unchanged and unchanging great region on earth. * * * The population is on the highway of the watercourses. * * * Apart from the Indians the population is a heterogeneous mixture. * * * There is a steady immigration of Portuguese, who form an industrious, hard-working population, and do most of the work. The population in the cities is extraordinarily varied, for the wealth coming from the rubber industry has attracted immigrants from the entire world. * * * Certain trades fall into the hands of different nationalities; the sale of dry goods by peddling is in the hands of the Armenians, and the very extended trade of prostitution is chiefly conducted by the Poles.

> In addition to rubber the region produces gutta-percha, sarsaparilla, tobacco, sugar, cacao, mandioca, piassaba fiber, nuts, and a variety of forest products, among them many valuable drugs. The chief exports are rubber, nuts, and sarsaparilla. The great wealth of the region, which has hardly been touched, lies in the timber, and as a source of natural wealth this can hardly be destroyed. There are many difficulties which lie in the way of its exploitation, the chief of these being the great variety of the growth. All of the wood has value as timber, but the character differs so greatly that the unsorted lumber could not be used for a common purpose, not even for the production of wood pulp. Doubtless, however, the time is approaching when the demand for lumber, with the rapidly decreasing supply, will compel the world to draw upon this seemingly inexhaustible source.

"Much of the life is inimical or certainly unfriendly to man." The unprovoked attack on a man by the jaguar is unusual. The boa constrictor, though rare, has been known to attack man. Among poisonous reptiles are the rattlesnake, the coral snake, and the jacaraca. Mention is made of an ant an inch or more in length, found chiefly in the forests, whose sting produces great pain and prostration and sometimes death. This is the Tucandera or conga. Of the "foraging ants" the most interesting is the Saüba or leaf-cutting ant, which carries sections of leaves to its nest. After the material has been prepared by chewing, it provides a soil for the growth of a fungus, which constitutes the ant's favorite food. It excavates long tunnels in the earth, with communications extending hundreds of feet, and

throws up mounds of earth several feet high. Nests are formed in the trees. Some species are winged.

The region is characterized by a small biting fly, 2 to 3 mm. in length and ½ mm. in breadth. Protection from the bite can be obtained only by close-meshed head nets and gloves. This fly is known as the pium and to it are ascribed the ulcers so common in this region. A more tormenting insect than the pium is the larval form of a species of Trombididea. It has a soft body, with 6 legs provided with claws and a powerful hypostoma, which it drives into the skin. It is so small as to be barely visible to the naked eye and is bright orange in color. The sting produces no irritation at the moment but later an indurated wheal several centimeters in diameter forms.

The small towns of the upper Amazon are usually situated on high ground and appear comparatively healthy, the malaria being milder than that seen on the lower Rio Negro.

In discussing malaria on the Rio Negro, 3 general types of infection are recognized: (1) An infection characterized by the presence of numerous parasites in the blood with little or no disturbance in health, especially in children under 10 years; (2) a chronic infection showing moderate anemia, weakness with considerable splenic enlargement. There is an absence or scarcity of organisms in the circulating blood. This corresponds to the so-called "malarial cachexia" of many writers. It is a predominating type in the Amazon region; (3) the ordinary type of infection as we see it in susceptible people from the temperate zone who visit the Tropics.

Chronic malaria is extremely prevalent in the Amazon Valley. Acute and malignant malaria was not observed by the Rice Expedition, but it is said to exist. Of the cases examined, only 7.2 per cent showed organisms in the circulating blood. No quartan forms were found.

Leprosy is widespread. No cases of yaws or filariasis were seen. Ulcers are extremely common and have recently acquired greater interest through the discovery in them of Leishmania. The accepted mode of treatment consists of intravenous use of tartar emetic.

CLINICAL DIAGNOSIS. A MANUAL OF LABORATORY METHODS, by *James Campbell Todd, Ph. B., M. D.* Fourth Edition. W. B. Saunders Co., Philadelphia, Pa., 1918.

A work of over 600 pages filled with illustrations of unusual merit.

DISEASES OF THE MALE URETHRA, INCLUDING IMPOTENCE AND STERILITY, by *I. S. Koll, B. S., M. D., F. A. C. S.* Illustrated. W. B. Saunders Co., Philadelphia, Pa., 1918.

The type, paper, and illustrations are of the high order which characterizes Saunders's publications. Besides many new drawings

illustrative of the text, there are numerous colored plates to illustrate the revelations of the endoscope. It is unfortunate that some confusion has arisen as to the nomenclature of the instruments shown on pages 80 and 81 and referred to on pages 80 and 86.

The chapters on nongonorrheal urethritis, on the history of gonorrhea, and on tumors of the urethra are interesting and include material not commonly found in other works.

The author claims to cure 60 per cent of his gonorrhea patients in from 5 to 10 days, provided he can see them within 24 hours after the discharge has begun. If he can cure 30 per cent of his patients in 20 days, he is doing well and his methods deserve to be made known.

He puts his patient to bed for 48 to 72 hours and directs him to drink 15 to 25 glasses of water in 24 hours, and teaspoonful doses of bicarbonate of soda are given for ardor urinæ. Instillations of albargin are made three or four times a day. The albargin, administered as a 1 per cent ointment, with gelatin and tragacanth as a base, with glycerin added for hygroscopic effect, should be retained 15 minutes, and then a swab made with a toothpick and coated with this material should be placed within the urethra for 15 minutes. If the patient can not endure the smarting of the albargin he should take injections of protargol solution twice a day, using 2 per cent strength and twice using a strength of ½ to 1 per cent. The treatment includes frequent immersion of the penis in very hot water. If the germs of gonorrhea are found after 24 hours this treatment has failed, but if the germs are not found this is not necesarily, a proof of success, since they may appear later. If no germs are found after 24 to 36 hours, stop the injections, but look several times a day for gonococci. When the bacteriological examinations have been negative for 24 hours give the alcohol test, "preferably a glass of beer or ale." No disastrous results having followed the alcohol test, wait a couple of days and then massage the penis, an anterior sound having been passed.

Next morning examine the secretion, and if it is negative a cure has been effected. No one reading Dr. Koll's book could fail to form a favorable opinion of the author's ability, but there is a sketchiness and lack of detail throughout which leaves one dissatisfied and unconvinced. The author concentrates into 52 lines all the advice, regarding preparation, operation, and after treatment, which he has to offer in connection with external urethrotomy, both with and without a guide. It would have been better to omit all reference to surgical treatment than to give only such a bare outline as

would scarce suffice to direct the beginner and yet would be superfluous for the expert.

APPLIED ANATOMY. THE CONSTRUCTION OF THE HUMAN BODY CONSIDERED IN RELATION TO ITS FUNCTIONS, DISEASES, AND INJURIES, by *Gaillym G. Deaver, M. D., LL. D.* Fifth Edition. J. B. Lippincott Co., Philadelphia, Pa., 1918.

A beautiful volume whose author has been more successful than is common in attempts to combine the teaching of anatomy and surgery. The drawings which illustrate surface anatomy are particularly instructive. A man may know his anatomy, both by the book and by the subject, and yet sometimes be confused, unable to tell his way about amid the muscles and bones, baffled by their cutaneous covering.

NAVAL HYGIENE, by *James Chambers Pryor, A. M., M. D.* P. Blakiston's Son & Co., Philadelphia, Pa., 1918.

The author is to be congratulated upon having accomplished the object which he set for himself, namely, to produce a "student's manual of elementary character." Few of the so-called manuals with which the book market is overstocked to-day can rival Commander Pryor's book, which is eminently clear, concise, and to the point and yet singularly complete and satisfying for a book of its size. It is only the author's modesty which characterizes as "elementary" the material presented. It would be hard to suggest any line for comprehensive alteration or improvement. Among the special features of the book may be mentioned (1) the appendix which gives the principal instructions to be observed in recruiting, in preparing health records, descriptive lists, finger prints, etc.; (2) a glossary of nautical terms employed; (3) the ready methods of calculating percentages and averages and rates of sickness for official statistical returns; (4) a complete index covering 34 pages. Of special interest, also, are the chapters on aviation, submarines and diving.

The book is eminently practical. It gives just enough and not too much for the medical officer who has to face the daily problems of life on board ship. While it will be a boon to the young medical officer making his first cruise, there is a vast amount of valuable information, culled from many sources, as well as from the varied experiences of the writer, which will have great interest for every member of the profession. The numerous illustrations not only subserve the intended purpose to elucidate the text but throw interesting and vivid sidelights on life afloat under the flag. (Medical officers may obtain this book by requisition on the Naval Medical Supply Depot, Brooklyn, N. Y.)

A TEXTBOOK OF ELEMENTARY MILITARY HYGIENE AND SANITATION, by *Frank R. Keefer, A. M., M. D.* Second Edition, Reset. W. B. Saunders Co., Philadelphia, Pa., 1918.

A nontechnical presentation of the topic has long been needed and this work fully meets the requirements. Being intended not for medical officers or members of the Hospital Corps but primarily for officers and men of other branches of the military establishments, the strictly medical topics have been lightly touched upon, while matters that should be generally known are discussed in greater detail. Excellent judgment has been shown in making this distinction in the language employed, in the illustrations, and in the size of the book. It does not seem unreasonable to require the mastery of its contents by all officers intrusted with the command of troops. In spite of the repeated lessons from previous campaigns, military and naval men are slow to grasp the extreme importance of hygiene and sanitation for the successful issue of their enterprises. Though it may be far off, the day is undoubtedly coming when the loss of from 5 to 20 times as many men from disease as from wounds will be as discreditable to those in command as a fault in strategy; when to permit any considerable proportion of one's available force to be made unavailable, through preventable sickness, will be held as criminal as to permit them to lose their lives through failure to afford adequate protection in trench, bomb-proof, and turret.

TROPICAL SURGERY AND DISEASES OF THE FAR EAST, *by J. R. McDill, M. D., F. A. C. S., Major, Medical Reserve Corps, U. S. A.* C. V. Mosby Co., St. Louis, Mo., 1918.

The author has collected and, under a misleading and inappropriate title, presents to the reader in a most attractive way many facts of interest regarding tropical diseases. His personal observations and suggestions are valuable. The illustrations are profuse and derived either from the author's collections or periodical literature. Without having much to say about surgery and without in any sense exhausting the topic of tropical diseases, the book still deserves a place in the library of a doctor going to the Far East.

THE SUBMARINE IN WAR AND PEACE. ITS DEVELOPMENTS AND ITS POSSIBILITIES, by *Simon Lake, M. I. N. A.* With 71 illustrations and a chart. J. B. Lippincott Co., Philadelphia and London, 1918.

This is the history of the development of the submarine from the time of David Bushnell's quasi achievement to the present time, written in a singularly interesting style, free from technicalities. Ample space is devoted to the achievements of Mr. Holland. The author's experiences when endeavoring to get an audience with a former Sec-

retary of the Navy are amusingly set forth. The concluding chapt deal with the future of the submarine.

Mr. Lake pleads the cause of the inventors and inveighs against t skepticism and indifference of the world, though he magnanimou alludes to the professional handicaps which prevent the naval of from taking up new inventions with proper avidity, but this nar tive is itself the best justification of the hesitation felt by the g eral public about backing an inventor. The failures, the narrow capes, the forgotten essentials that mark the progress of some g achievement, from its conception as an idea to its birth and later velopment into a device of commercial value, may well give t financier pause. The utter unreliability of the inventor has b appreciated by every form of government. The bold imaginative creative powers of the inventor are the very antithesis of t nicely calculated and meticulous operations of ordinary busin For a military man, who, to justify his control of men and leadership, must be regarded as eminently practical and relia the espousing of so doubtful a proposition as a new invention, is put in jeopardy the most valuable asset of his professional repu tion.

ANNOUNCEMENTS.

Mr. Herbert Putnam, the Librarian of Congress, and General Director of the Library War Service, American Library Association, has asked the **Bulletin** to give publicity to the following facts about the work of the Library War Service.

In a period of 7 months

1,271,800 books have been shipped to 89 large camps, where there are trained librarians and 36 library buildings;
185,000 books to 211 small camps;
130,000 books to 111 naval stations;
30,000 books to 111 vessels;
20,000 books among 81 hospitals—Army and Navy;
200,000 books for use on transports and overseas.

Thus 2,000,000 gift books have been sent out through 600 agencies.

In addition to all this, 850,000 new books, mainly technical, have been purchased and put to use.

The subjects covered range from fiction, poetry, history to technical and scientific works.

If there is any ship, camp, hospital or station without a supply of suitable reading matter for the men, send the following data to the Library War Service Headquarters, Library of Congress, Washington, D. C.:

Name and address of camp (or vessel);
Kind of camp (or vessel);
Approximate number of men in camp (or on board);
What agencies are supplying reading matter and to what extent;
What local library, if any, is cooperating;
How many and what kind of books are needed;
How many magazines are needed;
Where will reading matter be housed;
Who should be notified when books and magazines are shipped;
Will he arrange for the circulation of this reading matter throughout the entire camp (or vessel).

There is no red tape about getting the books; men in charge will be asked to keep simple records, instructions for which are furnished with each library.

There has recently been organized in New York a society called the American Defense Society, with headquarters at 44 East Twenty-third Street, New York, which counts among its officers an ex-Presi-

dent of the United States, an ex-Attorney General, an ex-Secretary of the Treasury, an ex-ambassador to Germany, an ex-ambassador to France, and other notables.

The specific purpose of this organization is to replace in the American market all articles manufactured in Germany by articles manufactured in America or elsewhere. The following is the pledge of membership, which we consider a comprehensive arraignment of Germany for its high crimes and misdemeanors:

That I may not directly contribute financial aid to the German military policy with its disregard of international law, its attacks on unfortified towns, its massacres of the innocent and the helpless, its enslavement of peoples, its use of poison gas and flames, its ignoring the Red Cross badge, its bombing hospitals, and its torpedoing defenseless merchant ships,

I pledge myself never to buy any article made in Germany.

A new magazine has recently made its appearance abroad. The first number of the

REVUE INTERALLIÉE POUR L'ÉTUDE DES QUESTIONS INTÉRESSANT LES MUTILÉS DE LA GUERRE

bears the date of April, 1918. It is the official organ of the Permanent Interallied Committee for collection, classification, and dissemination of information relative to the rehabilitation of the wounded. Dr. Bourrillon is president of this committee. The editor of the review is Dr. J. Camus, 102 Rue du Bac, Paris.

With Ales Hrdlicka as editor, and apparently under the auspices of the Smithsonian Institution, the first number of the

AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY

has recently made its appearance. The preface is an attempt to justify the "establishment of a new scientific journal. * * * at this critical period." The other articles are:

Hrdlicka, Ales: "Physical anthropology: Its scope and aims."

Miller, G. S., jr.: "The piltdown jaw."

Hooton, E. A.: "On certain Eskimoid characters in Icelandic skulls."

Holmes, W. H.: "Organization of the Committee on Anthropology of the National Research Council, and its activities for the year 1917."

NOTICE TO SERVICE CONTRIBUTORS.

When contributions are typewritten, double spacing and wide margin are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which requires correction before going to press. The BULLETIN endeavors to follow a uniform style in headings, and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues. This is not only important in special articles but still more so in reviews. For example, an article by P. A. Surg G. Alen, U. S. N., on Removal of the Gasserian Ganglion, should be headed as follows:

Removal of the Gasserian Ganglion.

By G. Alen, Passed Assistant Surgeon, United States Navy.

If a review is submitted of an article by J. E. Thompson, M. B., B. S. (Lond.), F. R. C. S. (Eng.), F. A. C. S., Galveston, Tex., Professor of Surgery, University of Texas, entitled "A Study of Modern Operations in Hypospadias from an Anatomical and Functional Standpoint," appearing in Surgery, Gynecology, and Obstetrics, Volume XXV, No. 4, October, 1917, the following heading would conform to the usage of the BULLETIN in recent years:

Thompson, J. E. Modern Operations for Hypospadias. Surg., Gynec., and Obst. October, 1917.

The author's initials are important, not so his titles. If the reviewer is not familiar with the exact abbreviation employed by the Index-Catalogue of the Surgeon General's Library and the style adopted by the American Medical Association Press, it is best to write the name of the periodical in full.

The *greatest accuracy and fullness should be employed in all citations*, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions which require illustration must be received two months prior to the date of the issue for which they are intended.

Only the names of actual reviewers for a current number appear.

The BULLETIN prints only original articles, translations, in whole or in part, and reviews and all original *contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

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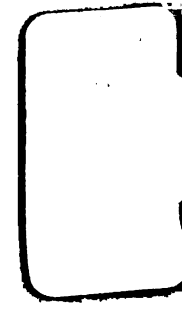
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